INSTALLATION RESTORATION PROGRAM PHASE II-CONFIRMATION/QUANTIFICATION STAGE 2

FINAL REPORT VOLUME 2. APPENDICES

FOR

TINKER AFB, OKLAHOMA

AIR FORCE LOGISTICS COMMAND WRIGHT-PATTERSON AFB, OHIO

PREPARED FOR

UNITED STATES AIR FORCE OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (OEHL) BROOKS AIR FORCE BASE, TEXAS 78235

OCTOBER 1985





DCN 85-212-027-21-03 Volume II

INSTALLATION RESTORATION PROGRAM PHASE II - CONFIRMATION/QUANTIFICATION STAGE 2

APPENDICES

FOR

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AIR FORCE LOGISTICS COMMAND WRIGHT-PATTERSON AFB, OHIO

OCTOBER, 1985

PREPARED BY

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APPENDIX A
Definitions, etc.



APPENDIX A

Definitions, Nomenclatures and Units

- AFB Air Force Base
- Aquifer geologic unit capable of storing and transmitting significant quantities of water.
- DOD Department of Defense
- EPA Environmental Protection Agency
- GC Gas Chromatography
- GC-MS Gas Chromatography-Mass Spectrometry
- Indurated rendered hard, as by heat, pressure or cementation
- IRP Installation Restoration Program
- mg/1 milligrams per liter
- POL Petroleum, oil and lubricants
- PVC Polyvinyl Chloride
- RCRA The Resource Conservation and Recovery Act
- RWDS Radiological Waste Disposal Site
- μg/L Micrograms per liter
- USAF United States Air Force



APPENDIX B
Scope of Work

INSTALLATION RESTORATION PROGRAM PHASE II, STAGE 2 FIELD INVESTIGATION TINKER AFB. OKLAHOMA

I. DESCRIPTION OF WORK

The purpose of this task is to determine if environmental contamination has resulted from solvent storage and waste disposal practices at Tinker AFB OK; to provide estimates of the magnitude, extent and direction of movement of contamination should contamination be found; to identify potential environmental consequences of migrating pollutants, and to identify future monitoring efforts required to document conditions at Tinker AFB.

Ambient air monitoring of hazardous and/or toxic material and Air Force personnel shall be accomplished when necessary, especially during drilling operations.

The presurvey report (mailed under separate cover) and Phase I IRP report (mailed under separate cover) incorporated background and description of the sites for this task. To accomplish this investigation, the contractor shall take the following actions:

A. General

- 1. All water samples collected shall be analyzed on site by the contractor for pH, temperature and specific conductance. Sampling, maximum holding time and preservation of samples shall strictly comply with the following references: Standard Methods for The Examination of Water and Wastewater, 15th Ed. (1980), pp. 35-42; ASTM, Part 31, pp. 76-86, (1980), Method D-3370; and Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp. xiii to xix (1979). Minimum detection limits and methods for analysis are shown in Attachment 1.
- 2. All wells installed during this effort shall be constructed of Schedule 40 PVC casing and screen. Each well shall be completed to ten feet below the level of the aquifer to be monitored, and ten feet of screen shall be set. Each well shall be provided with a surface grout seal, protective steel casing with locking cap and three guard posts placed radially away from the well.
- a. Shallow wells shall be installed into the first water bearing zone encountered (average depth, 30 feet). Well casing and screen shall be 2" ID PVC; wells shall be installed using hollow-stem auger drilling techniques.
- b. Deep wells shall be installed into the first significant saturated sandstone body encountered (average depth, 100 feet). Well casing and screen shall be 4" ID PVC; wells shall be installed using air-rotary drilling techniques.
- c. Total footage of wells installed shall not exceed 1190 linear
- 3. All contractor installed wells shall be developed, water levels measured and locations recorded on a project map and specific site maps. * Changes are underscored.

- 4. Field data collected for each site shall be plotted and mapped. The nature, magnitude and potential for contaminant flow within each zone to receiving streams and groundwaters shall be estimated. Upon completion of the sampling and analysis, the data shall be tabulated in the next R&D Status report as specified in Item VI.
- B. In addition to items delineated in A above, conduct the following specific actions at sites identified on Tinker AFB:
 - 1. Buried Tanks and Pits (Bldg 3001)
- a. Inventory past and present industrial operations to locate any buried storage tanks or pits within a quarter-mile radius around Bldg 3001. To perform the inventory, the contractor shall:
 - (1) review available Air Force records;
- (2) interview appropriate Tinker Air Force Base personnel; and,
- (3) conduct a detailed surface inspection tour. No tanks or pits shall be entered or sampled.
- b. Provide the results of this inventory, with summary of findings and recommendations for future work, in the final report specified in Item VI.

2. Base Water Supply Wells

- a. Measure depth to water in each available (27) base water supply wells, after a shutdown of 2-4 days for equilibration. Wells shall be shutdown and measured in blocks; the shutdown shall be coordinated with the contractor, but shall be performed by Tinker AFB personnel (included in Base Support, Item III).
- b. Determine the elevation of the piezometric surface and the local direction(s) of groundwater flow in the regional aquifer based on the depth-to-water measurements. Provide the depth-to-water data in the next R&D status report as specified in Item VI.
- c. Compile an inventory of all public and private wells in the vicinity of the eastern boundary of Tinker AFB based on data available from the State of Oklahoma. The contractor shall obtain these data from the state. Water pumping rates and static depth to water, where available, shall also be used in the calculation specified in I.B.2(b) above.

3. Landfill Six

a. Install three shallow and four deep monitor wells in the vicinity of Landfill Six. The shallow wells shall be installed along the northern boundary of the base (below toe of landfill); the deep wells shall be installed around the private well located north of the landfill (information on private well provided under separate cover).

- b. Sample each well twice for Volatile Organic Halogens (14 analyses). Sample each well once for Volatile Organic Compounds (VOC) and Base/Neutrals and Acid Extractable (BNE) compounds (7 analyses each for VOC and BNE).
- c. Collect and analyze one groundwater sample from monitor well #2A south of Landfill 6. The water sample shall be analyzed for purgeable Halocarbons using EPA Method 601. The contractor shall use the detection limits as specified by the method.

4. Radioactive Waste Disposal Sites

Conduct a geophysical investigation, using a magnetometer or equivalent technique to determine the exact location of the radioactive waste disposed at sites (EWDS) 1022E and 62598. Site RWDS 62598 contains a "lead still" made of sheet lead and is located south of Facility 1025 and north of Crutcho Creek (See Attachment 2). Site RWDS 1022E contains approximately 8-10 lead pigs containing low-level radioactive materials and is located adjacent to the northwest corner of Landfill No.3 south of West Crutcho Creek (See Attachment 2).

5. Building 3001

- a. Install seven deep monitor wells in the vicinity of Bldg 3001 between the building and the eastern base boundary. Three wells shall be installed along East Drive; four wells shall be installed along Douglas Boulevard.
- b. Sample each well twice for Volatile Organic Halogens (14 analyses). Sample each well once for VOC and BNE compounds (7 analyses each).

6. Stream Sediment Study

- a. Collect stream sediment samples at 24 locations on Tinker AFB as shown in Attachment 2.
- b. Analyze the sediment samples for the parameters shown in Attachment 3.
- C. Set up and drilling at site Landfill Six shall not proceed until written authorization is forwarded to the contractor by the PCO or his/her representative. The reason for this is that appropriate Tinker AFB personnel are in the process of obtaining the required permit(s) to drill on this non Air Force Property.

D. Data Review

Results of sampling and analysis shall be tabulated and incorporated in the Informal Technical Information report (Sequence 3 Attachment 1, and Sequence 2 Attachment 3 as reflected in Item VI below) and forwarded to USAF OEHL/TS for review. Results shall also be forwarded as available in the next monthly R&D status report.

E. Reporting

- 1. A draft report delineating all findings of this field investigation shall be prepared and forwarded to the USAF OEHL as specified in Item VI below for Air Force review and comment. This report shall include a discussion of the regional hydrogeology; well logs of all project wells; data from water level surveys; water and stream sediment analysis results; well, pit and tank inventories; available geohydrologic cross sections; groundwater surface and gradient vector maps; and Laboratory quality assurance information. The report shall follow the USAF OEHL supplied format (mailed under separate cover).
- 2. Estimates shall be made of the magnitude, extent and direction of movement of contaminants discovered. Potential environmental consequences of discovered contamination, where known, must be identified.
- 3. Specific requirements, if any, for future groundwater and surface water monitoring must be identified.

F. Meetings

Two of the contractor's Senior personnel shall meet with Air Force and/or state, county or federal officials on two occasions for 16 hours each to present and discuss the results of this investigation. Meetings will be held at Tinker AFB, on dates to be established later.

II. SITE LOCATION AND DATES

Tinker AFB OK USAF Clinic/SGB Dates to be established

III. BASE SUPPORT: Tinker AFB will provide the following base support for these sites:

A. Buried Tanks and Pits

- 1. Provide relevant installation records and access to, or support of, reproduction services.
- 2. Schedule interviews with appropriate base personnel and provide escort for industrial areas.

B. Base Water Supply Wells

- 1. Schedule and execute 2-4 day shutdown of blocks of base water supply wells. This will incur minimal effect on base water supply.
- 2. Provide wellhead elevation data of each base water supply well. If data is not available, base will obtain such data by surveying.

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C. Landfill 6

- 1. Provide required surveying to determine relative elevations of monitor wells.
- 2. Provide cuttings removal and drill site cleanup, including packaging when required.

D. Bldg 3001

- 1. Provide advance drill site clearance for selected locations.
- 2. Provide temporary construction barriers and parking/traffic control support for wells sited in parking lots and/or roadways.
- 3. Provide required surveying to determine relative elevations of monitor wells.
- 4. Provide cuttings removal and drill site cleanup, including packaging when required.
- IV. GOVERNMENT FURNISHED PROPERTY: None
- V. GOVERNMENT POINTS OF CONTACT
 - 1. Capt Robart Bauer
 USAF OEHL/TS
 Brooks AFB TX 78235
 (512) 536-2158
 AV 240-2158
- 2. Col Harry Russell
 HQ AFLC/SGPB
 Wright-Patterson AFB OH 45433
 (513) 257-6210
 AV 787-6210
- 3. Capt Darrel Cornell USAF Hospital/SGB Tinker AFB OK 73145 (405) 734-7844 AV 735-7844

VI. In addition to sequence numbers 1, 5 and 10 which are applicable to all orders, the reference numbers below are applicable to this order. Also shown are data applicable to this order.

Sequence No.	Block 10	Block 11	Block 12	Block 13	Block 14
Attachment 1					
4 3	ONE/R ONE/T	84 NOV 05	84 NOV 19	85 FEB 18	* 2
Attachment 3					
2	ONE/T	**	**		2

^{*}A minimum of two draft reports will be required. After incorporating Air Force comments concerning the first draft report, the contractor shall supply the USAF OEHL with a second draft report. The report shall be forwarded to the applicable regulatory agencies for their comments. Contractor shall supply the USAF OEHL with 25 copies of each draft report and 50 copies plus the original camera ready copy of the final report.

^{##}Upon completion of analysis.

Attachment 1

Analytical Methods and Required Detection Limits (For Water Unless Otherwise Shown)

<u>Parameter</u>	Method	Detection Limit
Arsenic	EPA 206.2	10 μg/L (1.0 μg/g, sediment)
Barium	or 206.3	
Cadmium	EPA 208.2	200 μ g/L (20 μ g/g, sediment)
Chromium	EPA 213.2	10 μ g/L (1.0 μ g/g, sediment)
Lead	EPA 218.1	50 μ g/L (5.0 μ g/g, sediment)
Mercury	EPA 239.2	20 μ g/L (2.0 μ g/g, sediment)
Selenium	EPA 245.1	$1 \mu g/L (0.1 \mu g/g, sediment)$
Silver	EPA 270.3	10 μg/L (1.0 μg/g, sediment)
Copper	EPA 272.2	10 μg/L (1.0 μg/g, sediment)
Zinc	EPA 220.1	20 μ g/L (2.0 μ g/g, sediment)
Maganese	EPA 289.1	$50 \mu g/L (5.0 \mu g/g, sediment)$
Nickel	EPA 243.1	50 μg/L (5.0 μg/g, sediment)
Fluoride	EPA 249.1	100 μg/L (10 μg/g, sediment)
Nitrate	EPA 340.2	100 μg/L (10 μg/g, sediment)
Cyanide	EPA 353.2	100 μ g/L (10 μ g/g, sediment)
Pheno1	Standard 412	10 μ g/L (1.0 μ g/g, sediment)
PCBs	EPA 420.1	1 μg/L (1.0 μg/g, sediment)
Total Organic	EPA 608	0.25 μ g/L (1.0 μ g/g, sediment)
Carbon (TOC)		,
Endrin	EPA 415.1	1000 µg/L (1000 µg/g, sediment)
Lindane	Standard 509A	$0.02 \mu g/L (0.02 \mu g/g, sediment)$
	Standard 509A	0.01 μ g/L (0.01 μ g/g, sediment)
Methoxychlor	Standard 509A	0.20 µg/L (0.20 µg/g, sediment)
Toxaphene 2,4-D	Standard 509A	1.00 µg/L (1.00 µg/g, sediment)
-	Standard 509B	0.06 μ g/L (0.06 μ g/g, sediment)
2,4,5-TP Silvex	Standard 509B	0.06 μ g/L (0.06 μ g/g, sediment)
Volatile Organic		18.57 332200,
Halogens	EPA 601	•
Volatile Organic		
Compounds (VOC)	EPA 624	**
Base/Neutrals and Acid		
Extractable Compounds		
(BNE)	EPA 625	••

^{*}Detection limits for Volatile Organic Halogens shall be as specified for the compounds by EPA Method 601. Method: Federal Register, Vol. 44, No. 233, pp. 69468-69473. This method should be strictly followed including these items:

Item 1.4 - This method is recommended by EPA for use only by experienced residue analysts or under the close supervision of such qualified persons.

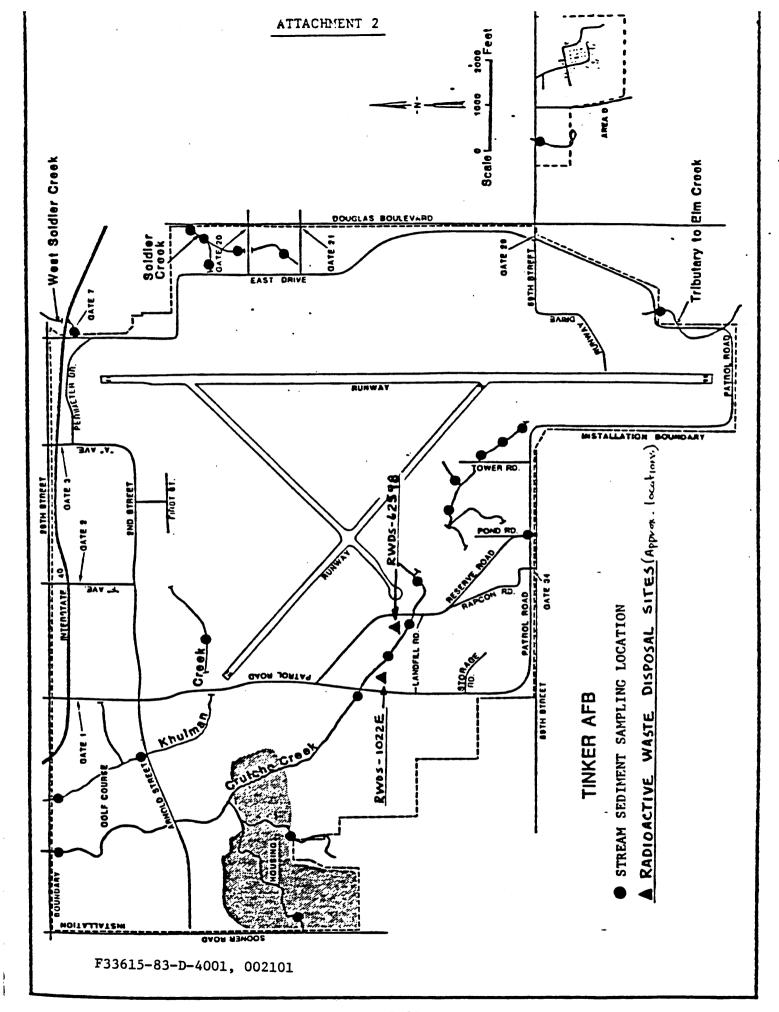
Item 2.2 - This is most important. If interferences are encountered (as in early peaks such as vinyl chloride), the method provides a secondary gas chromotographic column that will be helpful in resolving the compounds of interest from interferences. This must be done in the case of vinyl chloride and so noted in analysis report.

- Items 3.3, 7.1-7.3 These sections on interferences, contamination and QC should be strictly followed.
- Item 8.3 All samples must be analyzed within the recommended holding times.

 This must be followed without exception.

If questions are encountered about certain contaminants, you may be asked to show both chromatograms used to rule out possible interferences.

**Detection limits for VOC and BNE compounds shall be as specified for the compounds by EPA Methods 624 and 625 respectively.



Attachment 3

Analytic Parameters by Site

Number of Samples

			<u>р.1.0.0</u>	
Parameter .	<u>LF 6</u>	Bldg 3001	<u>QA</u>	Total
Volatile Organic				
Halogens	14	14	3	31*
Volatile Organic				
Compounds (VOC)	7	7	2	16
Base/Neutrals and Acid				*
Extractable Compounds				
(BNE)	7	7	2	16
	Stream :	<u>Sediment</u>	<u>QA</u>	Total
Arsenic	24	4	3	27
Barium	24	4	3	27
Cadmium	24	4	3	27
Chromium	24	4	3	27
Lead	24	4	3	27
Mercury	24	4	3	27
Selenium	24		3	27
Silver	24		3	27
Copper	24	•	3	27
Zinc	24		3	27
Maganese	24		3	27
Nickel	24		3	27
Fluoride	24		3	27
Nitrate	24	•	3	27
Cyanide	24		3	27
Pheno1	24	-	3	27
PCB's	24		3	27
Total Organic	_			
Carbon (TOC)	24		3	27
Endrin Lindane	24		3	27
	24		3	27
Methoxychlor Toxaphene	24		3	27
2,4-D	24		3	27
2,4-D 2,4,5-TP Silvex	24		3	27
2,7,J IF 31146X	24	•	3	27

^{*}Since each sample for Volatile Organic Halogens shall be analyzed twice (see method footnote item 2.2 in Atch 1), the contractor shall price 62 analyses by EPA method 601



APPENDIX C

Well Numbering System

The wells drilled for the Tinker Air Force Base Installation Restoration Program, Phase II Stage 2, were designated by Zone Number and sequential letters within zones. This nomenclature is an extension of that used in the Stage 1 investigation. Designators were assigned in the order in which the drilling locations were established. Zone 6 applies to the Building 3001 Investigation. Zone 7 applies to the Landfill 7 investigation. Table C-1 contains a list of all wells and cores for the project, listed by zone of investigation.



TABLE C-1. LIST OF WELLS

Building 3001 Area	1	
	Well 6A	Well 6E
	6B	6 F
	6C	6G
	6D	
Landfill 6	к	
	Well 7A	Well 7E (not completed)
	7B	7 F
	7C	7 G
	7 D	



APPENDIX D

Well Logs

This Appendix contains the logs of drilling and well completion activities for the project. Table C-1 (Appendix C) containes a list of all wells and cores for the project, listed by zone of investigation.



Lithologic Symbols Utilized	
Massive sandstone, fine-grained Sandstone beds with shale partings Shale with sandstone lenses Shale Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays Gravel	
 	C1212

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CORPOR	CATIO	_	

Sheet	1	of	3	

Boring or Well No. 6A

Location East Drive, north of Bradley Drive

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 26 June 1984 and end
26 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

		T			Jim Winnek, Inc.
Depth (ft)	Graphic	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
	VIII	None	grab	Gravelly clay fill.	
-			from cutting	CLAY, red-brown.	
			caccing		
5				CLAY, dark brown, damp, becoming	
				drier with depth, completely dry by 6'.	
I					
-					
10				SAND, red, fine, dry.	
I					
 -					
15—			l		
 -					
 -		-			
20		ļ	Ī		
20—		Ī	į	SHALE, red-brown, sandy, friable.	Nows hard 1.111
l			į	, salation, sandy, illable.	Very hard drilling minor water at 22',
					dry below, continu-
25					ous drilling.
_		İ			·
 -			İ		
 					
30—			İ		•
-					
-					
35				1	
				1	
-		1		CAND and I am	
				SAND, red-brown, fine.	
40		1		D7	

R	AL		N
COPP	OPAT	104	

Boring or Well No. 6A	Project Tinker AFB IRP Phase II Stage 2
ocation East Drive, north of Bradley Drive	Beginning 26 June 1984 and en
og Recorded By <u>W.M. Little</u>	26 June 1984 of drilling operation
	Sampling Interval (Estimated) variable (fi
	Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

Sheet 2 of _

					Jim winner, Inc.
Depth (ft)	Graphic	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40					
-					
-					,
45					
				SAND, brown, fine.	
_					
-				CTATE 1	
50				SHALE, brown, grey mottle, dry.	
-					
 -					
55 —					
-					
-					
60 —				SAND, red-brown, fine, dry.	
				,,,	
-					
 					
65					,
 					
-				GRAVEL, red-brown, fine, silt,	
				Sand, water returns.	
70 —					
-					
-					
75					
-					
l F				D-8	[
80		1]

RADI			Log	g of Drillin	ng Operations	Sheet 3 of 3
Boring or Wo Location <u>E</u> Log Recorde	ast Dri	ve, nort	h of Bra	ndley Drive		e 1984and end 4 of drilling operation ed) variable(ft
Depth (ft)	Graphic Log	No. of Sample Taken	ype of sample Taken		Stratigraphy	Remarks

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
80				Same materials. TD = 82'.	
85 —					
90 —					
95 —					
- - - -					
100					
105					
110					
115					
120				D-9	

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CORPORATION	_

Sheet	1	of	3

Boring or Well No. 6B
Location East Drive, south of Bradley Drive
Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 27 June 1984 and end
27 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

					Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
		None	grab	CLAY, brown, plastic (fill).	
5—			from cutting		
10				CLAY, brown.	
				CLAY, grey-brown, plastic.	
15—				CLAY, red-brown, sandy, dry.	
20				CLAY, mixed red-brown and brown-black, plastic, damp, minor sand. CLAY, brown, sandy.	
25					·
30					
				SAND, red-brown, fine, silty, dry. D-11	7-83-13718
40				~ 11	7.83

R	AD	A	N
		-	

Boring or Well No. 6B

Log Recorded By W.M. Little

Log of Drilling Operations

Project Tinker AFB IRP Phase II Stage 2 Location East Drive, south of Bradley Drive 27 June 1984 Beginning_ _and end 27 June 1984 of drilling operation

> Sampling Interval (Estimated) variable Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

Sheet _2

of_

Graphic Log ID No. of Sample Taken Type of Sample Taken Depth Stratigraphy Remarks (ft) Thin clay layers 40-42'. SANDY CLAY, red-brown. 45 50 55 -SAND, red-brown, fine, little clay. Same, lighter color. 60 -65. Same, damp. 70 -75. Same, moist. Driller reports beginning of water production. D-12

RADIAN

Sheet 3 of

Log of Drilling Operations

Boring or Well No. 6B				
Location <u>East Drive</u> ,	south	of	Bradley	Drive
Log Recorded By				

Project Tinker AFB IRP Phase II Stage 2 Beginning 27 June 1984 27 June 1984 27 June 1984 of drilling operation Sampling Interval (Estimated) variable (ft) Type Drill Rig and Operator Failing 1250

					Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
85 —					•
90 —				Same materials. TD = 90'.	
100					·
110					
120				D-13	

RA	Ð.	A	ę.
CORPOR	DATIO		

Sheet 1 of 3

Log of Drilling Operations

Boring or Well No. 6C	•	Project _Tinker AFB IRP Phase II Stage 2
Location East Drive at Entry Road A		Regioning 27 June 1984
Log Recorded By <u>W.M. Little</u>	_	28 June 1984 of drilling operation
		Sampling Interval (Estimated) variable (ft)
		Type Drill Rig and Operator Failing 1250

	7			-	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
		none	grab from cuttings	CLAY, brown, with gravel (fill).	
5——				CLAY, dark brown, sandy. SANDSTONE, light brown, hard, dry.	
10				SANDY CLAY, red-brown, increasing sand with depth.	
15—- - -				SAND, red-brown, some clay.	
20 —				some sand, drier with depth.	Minor water at ∿20', dry below, continuous drilling.
30-				SAND, red-brown, fine, dry.	
35					
40				D-15	7.30, 40720

RA	DI	A	N

Sheet	 2	_of_	3	_

Boring or Well No.	6C				
Location East Di	cive a	t Entry	Road	A	
Log Recorded By	W.M.	Little			

Project Tinker AFB IRP Phase II Stage 2 27 June 1984 Beginning_ 28 June 1984 of drilling operation Sampling Interval (Estimated) variable Type Drill Rig and Operator Failing 1250

				· · · · · · · · · · · · · · · · · · ·	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40				No discharge.	
45 —					
50				SAND, red-brown, fine, some clay.	
55 —		·		SAND, red-brown, fine.	
60 —					
65				No change.	Shale streak at 63'.
70 —					Begin water produc-
75				SAND rod-brown fire sile	Count materials
80				SAND, red-brown, fine, silt, some water. D-16	Scant returns.

RA	DI	4	N

Sheet __3__ of __3

Log of Drilling Operations

Boring or Well No. 6C	
Location East Drive at Entry Road	A
Log Recorded By	

Project Tinker AFB IRP Phase II Stage 2

Beginning 27 June 1984 and end
28 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

				Type Drill Hig and Operator	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
80				SAND, red-brown, medium.	
85 —				SANDSTONE, red-brown, friable.	Hard drilling.
90 —				TD = 90.	
95 —					
100					
- - - -					
105					
110				·	·
115					
120				D-17	·

R	ADIAN	•
COR	PORATION	_

Sheet <u>1</u> of <u>2</u>

Boring or Well No. 6D Location Douglas Blvd north of Published	Project _Tinker AFB IRP Phase II Stage 2
Location <u>Douglas Blvd. north of Bradley Drive</u> Log Recorded By <u>W.M. Little</u>	19 June 1984 of drilling operation
	Sampling Interval (Estimated) variable (ft) Type Drill Rig and Operator Failing 1250

				- Type Diffi Aig and Operati	
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Jim Winnek, Inc. Remarks
		none	grab from cutting:	CLAY, dark red-brown, with graves (fill).	L
5				CLAY, red-brown, minor sand. SHALE, weathered, red-brown, friable, minor sand.	
10					
15—				SHALE, red-brown.	
20				SAND, fine, red-brown.	
25 —					·
30—					·
35			5	SAND, fine, red-brown, thin clay layers.	Harder drilling.
40				D-19	7-83-13718

RA	D		A	N	
COPPOS	2071	•	•		

Sheet	2	of	2
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Boring or Well No. 6D Project Tinker AFB IRP Phase II Stage 2

Location Douglas Blvd. north of Bradley Drive Beginning 19 June 1984 and end

Log Recorded By W.M. Little 19 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

				•	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40 -				SAND, fine, red-brown, fines.	Begin water production.
45 —				SHALE, red-brown. SAND, medium, fine gravel, fines.	Reduced water pro- duction. Water production ∿1 gpm or less.
50					OI.
55 —				Same materials. TD = 57'.	
60 —	5 1./61150			·	
65					·
70 —					·
75					
80				D-20	·

RA	DI	A	P.
COPPOS	DITA	-	

Sheet $\frac{1}{}$ of $\frac{3}{}$

Boring or Well No. 6E

Location Douglas Blvd. & Entry Road A

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 19 June 1984 and end

19 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft).

Type Drill Rig and Operator Failing 1250

			,		Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
		none	grab from	CLAY, red-brown, sandy, with	
			cuttings	mixed gravel (fill). Same, no gravel.	
				•	
5—					
	7////			SHALE, weathered, red-gray, minor	
10				sand, changing to red-brown with	
				depth.	
 -				CHAIR	
15—				SHALE, sandy, red-brown, friable, increasing sand with depth.	
-			l	SAND, fine, friable red-brown, minor fines.	
-				minor rines.	
20		ŀ			
_			l	•	
25					
25		1	ĺ		·
-				SHALE, red-brown.	
-				·	
30—					
				1	
		1	- 1		İ
				1	
35				SAND, fine, friable, red-brown,	
F				minor fines.	
				SHALE, red-brown, with grey mottling.	
40				D-21	S

R	A	D		A	ę.
COD		ATI	0		

Sheet $\frac{2}{}$ of $\frac{3}{}$

Boring or Well No. 6E

Location Douglas Blvd. & Entry Road A

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 19 June 1984 and end

19 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

				-	Jim willer, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40	************			SAND, fine, tan/pink, clean.	
				SAND, fine, red-brown.	
45 —					
-					
<u> </u>					
50					
F					
F					
55 —					
60					Scant returns 60-70';
E					add ∿80 gals. water to clean hole, lift
-					cuttings.
65 —					·
-					
70				SAND, medium, red-brown, with fine gravel and fines.	·
75					
<u> </u>					
F				D-22	·
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RA	DI	AN
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Boring or Well No.	6E				
Location Douglas	Blvd.	&	Entry	Road	A
Log Recorded By					

Project Tinker AFB IRP Phase II Stage 2

Beginning 19 June 1984 and end 19 June 1984 of drilling operation Sampling Interval (Estimated) variable (ft)

Sheet <u>3</u> of <u>3</u>

Type Drill Rig and Operator Failing 1250

				Type Drill Hig and Operato	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
85 —				Same materials, more indurated.	Harder drilling, driller reports minor water.
90					
95 —				Same materials.	Scant returns, water in hole when change
105					rods.
110					Water production ∿1 gpm.
115				Same materials. TD = 115'.	Water production 3-5 gpm.
120				D-23	07.404

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CORPORATION

Boring or Well No. 6F Location DPDO Yard

Log Recorded By W.M. Little

Log of Drilling Operations

:	Project Tinker AFB IRP Phase II Stage 2
	Beginning 20 June 1984 and end
	20 June 1984 of drilling operation
	Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Sheet ___1__ of ___3

		T		-	Jim Winnek, Inc.	
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks	
-		none	grab from cutting	SHALE, weathered, red-brown.		
5—	200000000000000000000000000000000000000			SHALE, grey. SHALE, red-brown.		
10				SAND, fine, red-brown, minor silt. SHALE, pink, turning red-brown with depth, very dry.	Hard drilling, high dust.	
15						
20						
25—			s	SAND, fine, pink/tan.		
30			S. h	ANDY SHALE, red-brown, some thin ard streaks.		
35				·		
40				D-25		7-83-13718

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	200		•			

Sheet ____2__ of __

Boring or Well No. 6F Location DPDO Yard Log Recorded By W.M. Little Project Tinker AFB IRP Phase II Stage 2 20 June 1984 Beginning_ and end 20 June 1984 of drilling operation Sampling Interval (Estimated) variable Type Drill Rig and Operator Failing 1250

				· · · · · · · · · · · · · · · · · · ·	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40 -					
45 —				SAND, medium, red-brown.	
50				SAND, medium, red-brown, with fine gravel.	
55 —				SAND, fine, tan/yellow. SAND, fine, brown, with shale pebbl SANDSTONE, grey, hard. SHALE, red-brown.	es.
60 —					
65					·
70 —				SAND, fine, red-brown.	·
75 —					
80				D-26	

RADIAN	Lo	og of Drilling Operations	Sheet3 of3		
Boring or Well No Location <u>DPDO Yard</u> Log Recorded By		Beginning 20 Jun 20 June Sampling Interval (Estim	Beginning 20 June 1984 and end 20 June 1984 of drilling operation Sampling Interval (Estimated) variable (ft) Type Drill Rig and Operator Failing 1250		
Graphic Log	ID No. of Sample Taken Type of Sample Taken	Stratigraphy	Jim Winnek, Inc. Remarks		
85 — 90 — 90 — 910 — 100 — 105 — 110 — 115 — 120 — 120		SAND, fine, red-brown, soft. SANDSTONE, hard. Same materials. TD = 102'.	Sand collapse, add water to clean hole. Scant returns.		

RADI	AN		Loc	a of Drillin	g Operations	Sheet1 of3
Boring or W Location <u>We</u> Log Recorde	est of B	ldg. 311	7		Project <u>Tinker AFB IRP</u> Beginning	and end
`			•		Sampling Interval (Estimat Type Drill Rig and Operato	ed) <u>variable</u> (ft) r <u>Failing 1250</u>
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken		Stratigraphy	Jim Winnek, Inc. Remarks
10		none	grab from cuttings	SHALE, red-		Mud on bit, minor water, dry below, continue drilling.

D-29

7-83-13718

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Sheet $\frac{2}{}$ of $\frac{3}{}$

Log of Drilling Operations

Boring or Well No. 6G	Project Tinker AFB IRP Phase II Stage 2
Location West of Bldg. 3117	
Log Recorded By <u>W.M. Little</u>	of drilling operation
	Sampling Interval (Estimated) variable (ft)
	Type Drill Rig and Operator Failing 1250

/pe Drill Hig and Operator Falling 1230

Jim Winnek, Inc.

			-		Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40				No change.	
45 —				Shale streak.	Hard drilling.
50				Shale streak.	Hard drilling.
55				Shale streak.	Hard drilling.
60 —				SANDY CLAY, red-brown, damp.	
65				Shale streak.	Hard drilling.
70					
75 —		·			
80			•	SAND, red-brown, fine scant returns. D-30	

RADIAN	Sheet 3 of 3 Log of Drilling Operations
Boring or Well No. 6G Location West of Bldg. 3117 Log Recorded By	Project Tinker AFB IRP Phase II Stage 2 Beginning and end of drilling operation Sampling Interval (Estimated) variable (ft) Type Drill Rig and Operator Failing 1250 Jim Winnek, Inc.

				Type Drill Hig and Operator	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
85 —				Shale streak.	Hard drilling. Begin water production.
90 —				Same materials. TD = 90'.	
95 —					
100					
105					
110					·
115					ω
120				D-31	7-83-13718

RA	D	A	N
CORPOS	DITAS	_	

Sheet	1	of	3

Boring or Well No. 7A

Location Adjacent (north) of SE 59th St.

Log Recorded By L.N. French

Project Tinker AFB IRP Phase II Stage 2

Beginning 11 July 1984 and end

11 July 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc. ID No. of Sample Taken Type of Sample Taken Depth (ft) Stratigraphy Remarks none grab CLAY-FILL, dark brown-red, organic Soil probably reprefrom fragments, silty sand; grades to sents highway fill. cuttings sandstone. Drilling performed with 7-7/8" diameter SHALE, red-brown, plastic, tricone bit. weathered appearance. 5. SANDSTONE, fine-grained, red-Cuttings damp at 11'; orange, friable. minor water produced 10_ to 20'. 15-20-Much water blown from hole at 22'. SANDSTONE/SHALE (gradational con-25tact with above sandstone), interbedded red-orange sandstone and shale, saturated. 30-35. Rig vibrates at 35'. D-33

RA	D	A	N
CODDO			

Sheet 2

oring or Well No. 7A	Project Tinker AFB IRP Phase II Stage 2
ocation Adjacent (north) of SE 59th St.	Beginning 11 July 1984 and end
og Recorded By L.N. French	11 July 1984 of drilling operation
	Sampling Interval (Estimated) variable (ft)
	Type Drill Rig and Operator Failing 1250
	Jim Winnek Inc

	· · · · · · · · · · · · · · · · · · ·			<u>:</u>	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
45 —					No water produced at 42' after adding drill rod.
50		·			Harder and slower drilling at 47'; increasing water production below 49'.
55				SANDSTONE, fine-medium grained, orange, friable, slightly moist.	Easy drilling below 55'.
60					Hole caved slightly
65					at 62 '.
70 —				Sandstone is dry.	
75				D-34	

RA	D.	A	V
COPPOS	DATIO		

Boring or Well No. 7A

Location Adjacent (north) of SE 59th St.

Log Recorded By L.N. French

Project Tinker AFB IRP Phase II Stage 2

Beginning 11 July 1984 and end

11 July 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

Sheet <u>3</u> of <u>3</u>

		T				Jim Winnek, Inc.
80	Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
85	-				SANDSTONE with few mottled shale fragments, trace gravel.	Few cuttings returned below 84'.
90	+++++++++++++++++++++++++++++++++++++++					Water produced at 88'; dry at 93'.
. 95	- - - -					
100						Poor cuttings return.
105						
110. 115			٠	·	End of boring-110'.	Rig vibrates at 108-109'.
120					D-35	1 82 12710

RA	D	A	N
CORPOR	ATIO	™	

				-
Sheet	1	of	2	

Boring or Well No. 7B
Location North of SE 59th St.
Log Recorded By L.N. French

Project Tinker AFB IRP Phase II Stage 2

Beginning 10 July 1984 and end

11 July 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

	Type Drill Rig and Operator Failing 1250				
		T=			Jim Winnek, Inc.
Depth (ft)	Graphic	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
10		none	grab from cuttings	SAND, red-brown, some clay and or ganic fragments. SANDSTONE, fine to medium grained red-brown, friable, slightly moist, lenses and layers of SHALE red-brown, mottled, plastic.	with 7-7/8" diamete tricone bit.
25—				SHALE, red-brown, moist, plastic; with thin sand laminae. Shale is interbedded with fine-grained, orange sandstone.	·
35			r Mo	ANDSTONE, fine to medium grained, ed-brown, friable. oist; interbedded with SHALE, red-rown, mottled, plastic.	Driller notes damp conditions, few cuttings returned to surface. Few cuttings returned to surface.
40				D-37	·

RADI	AN		Log	of Drilling Operations	Sheet 2 of 2
Boring or Wo Location <u>No</u> Log Recorde	ell No rth of S ed By <u>L</u> .	7B E 59th S N. Frenc	St.	Project <u>Tinker AFB</u> Beginning 10 3 11 3 Sampling Interval (Es	IRP Phase II Stage 2 July 1984and end July 1984of drilling operation stimated)variable(ft) perator Failing 1250 Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
45				End of boring - 45'.	Drilling suspended; much water blown fro hole.
55		·			
60 +					
65					
70 —					
75				D-38	·

RA	DI	A	N
CORPOR	PATIO	_	

Sheet 1 of 3

Log of Drilling Operations

Boring or Well No	7C
Location North of	SE 59th St.
Log Recorded By	L.N. French

Project Tinker AFB IRP Phase II Stage 2

Beginning 10 July 1984 and end 10 July 1984 of drilling operation Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Type Drill Rig and Operator Failing 1250						
				Jim Winnek, Inc.		
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks	
5		none	grab from cuttings	SANDSTONE, fine-medium grained, red-brown, friable, uniform texture, dry. Grades to orange-red color below 3'. Thin sandy soil (less than 1') at surface. Thin layers/lenses of SHALE, red, plastic; between 9-11'.	Drilling performed with 7-7/8" diameter tricone bit.	
15—			Ī	Indurated sandstone, white at 15'. SHALE, red-brown, plastic, slightly moist, few lenses or layers of fine-med. grained sandstone (indurated zone at 18').	Harder drilling at 15', 18'.	
20						
25						
35			3	SANDSTONE, fine-medium grained, slightly indurated, slightly moist.	Rig vibrates at 34'.	
40				D-39		7-83-13718

R	A	D		A	N
			_		

Sheet	2	of	3

Boring or Well No. 7C
Location North of SE 59th St. Log Recorded By L.N. French

Project Tinker AFB IRP Phase II Stage 2 10 July 1984 Beginning_ and end 10 July 1984 of drilling operation Sampling Interval (Estimated) variable

	Failing 1250 Jim Winnek, Inc.				
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40				Increasing moisture at 42', few cuttings returned.	
<u> </u>					
45					
50				Decreasing moisture, increasing silt content, few thin shale	
F				layers.	
55 🛨					
þ				Sandstone is orange, no silt, friable.	
60 🕂				SHALE, red-brown, plastic, slightly moist; some sandstone lenses and layers in shale matrix.	
E				layers in share matrix.	
65					·
E					
70					
-				SANDSTONE, fine to medium grained, trace shale fragments, red-brown.	
75					Rig vibrates at 77'.
-			:	Few cuttings returned to surface.	
80				D-40	

R	A	D	12	4
		PATI		

Boring or Well No. 7C

Location North of SE 59th. St.

Log Recorded By L.N. French

Log of Drilling Operations

Project Tinker AFB IRP Phase II Stage 2 Beginning _____10 July 1984 _and end 10 July 1984 of drilling operation Sampling Interval (Estimated) variable (ft)

Sheet 3 of 3

	Failing 1250 Jim Winnek, Inc.				
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
85 —				Sandstone mixed with shale frag- ments.	Rig vibrates at 88'.
90					Water blown from hole after pause in dril-ling; drilling to 102' yielded very few cuttings.
100				End of boring - 102'.	·
110					
115				D-41	62.42740

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CORPORAT	TOM

Sheet ___1_ of _2__

Boring or Well No. 7D

Location West edge of Landfill 6

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 28 June 1984 and end
28 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

				•	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
	11111	none	grab	Clay-loam soil, brown.	
			from		
			cuttings		1
ΙΓ				Sandy clay, red-brown.	
5—					
	IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII				
1 F					
1 -				Shale, red-brown, weathered.	[
 -				,	į
10					
 					
-			ĺ		
		• 1		01 1	
		1		Shale, red-brown, slight to no	
15		I	l	weathering.	
		i	ł		
		1	j		
			-		
		1			
1 F 1	************		i	Sand, red-brown, fine, some silt.	
20				, , , , , , ,	
1 - 1					
		1	ł	Sand, red/tan, fine, becoming red-	
-			1	brown by 24'.	
25					
		1	1		
			1		
30 F		İ			
30—		l		1	
					•
				1	
				1	
,					
35			1		İ
-		İ			i
- F					
H			l		
40		Ì		No change. D-43	
40			I	ł	i

R	A	D		A	N
	200		_		

Sheet 2

Boring or Well No. 7D	Project Tinker AFB IRP Phase II Stage 2
ocation West edge of Landfill 6	Reginning 28 June 1984 and and
og Recorded By W.M. Little	28 June 1984 of drilling operation
•	Sampling Interval (Estimated) variable (ft
	Type Drill Rig and Operator Failing 1250
	Jim Winnek, Inc.

	· ·		Jim Winnek, Inc.		
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40				No change.	
45 —				Shale streak.	Hard drilling, 4".
50				Same materials, slight moisture.	
55 —				Shale streak. Sandy clay, red-brown, moist.	Hard drilling, 2".
60 —				No change.	Little water produc-
65					tion.
70 —					·
75				Same materials. TD - 75'.	
80				D-44	·

RADI	AN
CORPORATION	M

				_
Sheet	_1_	of	2	

Location North edge of Landfill 6 Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2 Beginning 21 June 1984 and end

of drilling operation Sampling Interval (Estimated) variable Type Drill Rig and Operator Failing 1250

					Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
		none	grab from cuttings	Clay, red-brown, plastic.	
5			SS grab from cuttings	Clay, grey, sandy. Clay, red, mottled w/grey, firm, sandle, weathered, red-brown. Sand, fine, red-brown, damp.	andy. Spoon refusal at 6'.
10				Sand, red-brown, fine, many fines.	
20					Negative Draeger
25—				and rod-brown and the	hydrocarbon, polytest.
30			.	and, red-brown, sandstone gran- les, damp.	
40				D-45	Harder drilling.

R	A	D	1	A	N
rno	200	2071	~		

Sheet 2 _ of ___2

Boring or Well No. 7E Location North edge of Landfill 6 Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2 Beginning_ 21 June 1984 _and end of drilling operation Sampling Interval (Estimated) variable Type Drill Rig and Operator Failing 1250

					Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
45 —				Sand, red-brown, fine, becoming darker with depth.	
60 —				Same materials. TD = 60', no water encountered.	Hole dry 6/22/84. Abandon by grouting.
70	·	-	·		
	·			D-46	

RA	D	A	N
COPPOS	PATIO	•	

Sheet	1	of	1

Boring or Well No	7F
Location North edge	e of Landfill 6
Log Recorded By W	

Project Tinker AFB IRP Phase II Stage 2

Beginning 22 June 1984 and end

22 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

			-	Jim Winnek, Inc.
Oepth Graphic	Log ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
10 — 15 — 20 — 25 — 35 — 35 — 35 — 35 — 35 — 35 — 35	OI none	grab from cuttings	Sand, red-brown, fine, silty.	
E			D-47	

RA	D	A	N
CODDO			

Sheet	1	of	1	
SHEEL		_ 01		

Boring or Well No. 7G

Location East edge of Landfill 6

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 21 June 1984 and end
21 June 1984 of drilling operation

Sampling Interval (Estimated) Variable

Sampling Interval (Estimated) variable

Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

				•	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
5		none	grab from cuttings	Clay-loam soil, dark brown, damp. Sand, red-brown, fine, silty,	Negative Draeger hydrocarbon.
15				damp. Sand, red-brown, fine, damp.	
25—				Clay, brown, moist. Gravel, fine, silty and sandy.	Heavy water production.
30				Same materials. TD = 30'.	
40		,		D-49	



Well Completion Logs



TABLE D-1. SPECIFICATION SHEET FOR GRAVEL PACK USED

	Typical	Grading	Effective	Uniformity	
Screen	Average	Range	Average	Range	Coefficient
6	0%	0	1.25	1.18-1.30	1.53
8	3.7%	2.1-5.1			
10	22.9%	18.0-25.6			
12	51.4%	45.6-62.3			
14	72.8%	66.5-79.0			
16	94.6%	89.9-99.4			
20	98.4%	96.0-99.9			
25	98.6%	96.5-99.9			

Well Completion Log: Sheet 1/2

Boring or Well No. 6A	Project Tinker AFB IRP Phase II Stage 2
Location East Drive, north of Bradley Drive	Log Recorded By W.M. Little
26 Turn 1007	
Construction started 26 June 1984	completed26 June 1984
Development started 26 June 1984	completed 26 June 1984
Total depth drilled (44) 82 feet.	
Total depth drilled (ft) 82 feet. Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling None	
Water source for drilling and completion procedures	base supply
_	
Number and type of samples collected <u>Grab samp</u>	les from discharge
Complete and the companies of the compan	
Storage method(a) plastic base ambient to	
Storage method(s) plastic bags, ambient to	emperature
Casing type Schedule 40 PVC, flush joint	Diameter4_inches
Depth of casing (ft) 72 feet	
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
Slot size 0.020 inches Scre	een interval (ft-ft) 72-82 feet
Type(s) of glue used to join casing none	
-	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used <u>see next page</u>	
Grain size distribution of gravel pack see specific	
Lithology of gravel pack Quartz, trace rock frag	
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft) 62-82 feet	
5 Paor (11 11)	
Interval of bentonite seal (ft-ft) 60-62 feet Interval of grouting (ft-ft) 0-60 feet	
interval of grouting (it-it)	
Description of security measures 8 inch stool are	
	otective casing and lid; secured with padlock
Padlock ID No. Master 3213 Lo	ocation of key(s) TAFB/SGB, DEEP; Radian
	~ .
D-55	·

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Project Tinker AFB IRP Phase II Stage 2 Boring or Well No. 6A Location East Drive, north of Bradley Drive W.M. Little Log Recorded By. **Construction Schematic** (ft) approx. 67 feet Static level of water before___ _(ft) and after 65 feet _(ft) development _ Development started 1700 hrs, 26 June 1984 Protective Development ended 1755 hrs, 26 June 1984 casing 0 4 Quantity of water discharged during development 30 gallons Type, size/capacity of pump or bailer used for development -Air lift (drilling rig) with variable discharge Depth of open hole inside well_ 10 82 feet Before development_ 82 feet After development ___ (ft) PVC **Development Record** casing 20 Lithology and Clarity and Odor Grain Size of Conduc-Time Color of of Remarks Removed tivity Discharge Discharge Sediment Grout 1700 Red. None Silt Slowly heavy silt clearing 30 apprx. 1/2 1730 Begin surging 1-minute cycles, heavy gpm. silt with each new cycle, slowly clearing. Resume continuous discharge, slowly 1750 clearing, greater flow (>1/2 gpm). 1755 Cease developing. 50 60 Bentonite ∇ Static water level 70 4" Gravel pack PVC screen 80.

D-56

Well Completion Log: Sheet 1/2

Boring or Well No. 6B	Project Tinker AFB IRP Phase II Stage 2
Location East Dr., South of Bradley Drive	Log Recorded ByW.M. Little
Construction started 27 June 1984	completed <u>27 June 1984</u>
Development started 27 June 1984	completed27 June 1984
Total depth drilled (ft) 90 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling None	
Water source for drilling and completion procedures.	hace cupply
	base supply
Number and type of samples collectedGrab_samp	les from discharge
Sample interval (ft-ft) variable	
Storage method(s) plastic bags, ambient t	emperature
Schedule 40 PVC flush joint	
Casing type Schedule 40 PVC, flush joint 80 feet	Diameter 4 inches
Depth of casing (ft) 80 feet	
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
Slot size 0.020 inches Scre	en interval (ft-ft) 80-90 feet
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used <u>see next page</u> Grain size distribution of gravel pack see specific	
Grain size distribution of gravel pack see specific	eation sheet
Lithology of gravel pack Quartz, trace rock frag	
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft)75-90 feet	
Interval of bentonite seal (ft-ft)	
Interval of grouting (ft-ft) 0-70 feet	
mervar or grouning (it-it)	
Description of security measures 8 inch steel pro	ptective casing and lid; secured with padlock
	etective casing and iid; secured with padlock
	:
Padlock ID No. Master 3213	ocation of key(s) TAFB/SGB, DEEP; Radian
D-57	cation of key(s)
	F .

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Project Tinker AFB IRP Phase II Stage 2 Boring or Well No. 6B Location East Drive south of Bradley Drive W.M. Little Log Recorded By_ Construction Schematic (ft) Static level of water before___ 64 feet _(ft) and after 64 feet (ft) development _ Development started___ 1315 hrs. 27 July 1984 Protective casing Development ended____ 1415 hrs. 27 July 1984 0 Quantity of water discharged during development 20 gallons Type, size/capacity of pump or bailer used for development ___ Depth of open hole inside well_ 10 90 feet Before development____ 90 feet After development ____ . (ft) **PVC** casing **Development Record** 20 . Lithology and Clarity and Odor Grain Size of Conduc-Time Color of of Remarks Removed tivity Discharge Discharge Sediment Grout 1315 Red, None Silt, Very low heavy silt minor flow, begin 30 fine sand surging, slowly clearing. 1415 Red, mod-None Silt, chg erate 60 • turbidity Static ∇ water level 70 Bentonite 80 Gravel pack PVC screen 90

D-58

Well Completion Log: Sheet 1/2

Boring or Well No. 6C	Project Tinker AFB IRP Phase II Stage 2			
Location East Drive at Entry Road A	Log Recorded By W.M. Little			
Construction started 27 June 1984	completed28 June 1984			
Davolanment started 28 Tune 100/	completed 28 June 1984			
Total depth drilled (ft)90 feet				
Hole diameter 8 inch				
Drilling method air rotary				
Problems encountered during drilling none				
Water source for drilling and completion procedures	base supply			
Number and type of samples collected Grab samp	les from discharge			
Sample interval (ft-ft) <u>variable</u>				
Storage method(s) plastic bags, ambient t	emperature			
Depth of casing (ft) 80 feet Screen type Schedule 40, PVC, mill slot Slot size 0.020 inches Screen type(s) of glue used to join casing none	Diameter 4 inches Diameter 4 inches een interval (ft-ft) 80-90 feet			
Type of gravel pack used 8-12 sand				
Amount of gravel pack used see next page				
Grain size distribution of gravel pack see specific				
Lithology of gravel pack Quartz, trace rock frag Source (company and quarry/pit) Arkhola Sand &				
odardo (company and quarry/pit)	Graver, rt. Smith, Ar			
Interval of gravel pack (ft-ft)61-90 feet				
Interval of bentonite seal (ft-ft) 57-61 feet				
Interval of grouting (ft-ft)0-57_feet				
Description of security measures 8 inch steel pro	otective casing and lid; secured with padlock			
Padlock ID No. Master 3213	MATRICON DEED D. L.			
D-59	ocation of key(s) TAFB/SGB, DEEP; Radian			

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Boring or Well No.	6C				ker AFB IR			age 2
Location East Dri	tion <u>East Drive at Entry Road A</u>			Log Recorded By W.M. Little				
Construction Sch	nematic							
0 P	rotective casing	Static level of water before approx. 67 feet (ft) and after 67.5 feet (ft) development Development started 1050 hrs, 28 June 1984 Development ended 1300 hrs, 28 June 1984 Quantity of water discharged during development 20 gallons Type, size/capacity of pump or bailer used for development						
10 4" PVC casing		Air lif Depth of c	t (drilling	ide well	variable eet	discha	rge	
	out							
20 🗕				Develop	ment Record	i		
		Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks
30		1050	Red, heavy silt	None	Silt			Very low flow
		1150	Red, mod- erate silt		Silt			Slowly ele- vating
60 Ber	ntonite	1300			ons from h	ole, sl	lowly (learing.
	atic ter level							
80 Grapac	avel ck							
90								ı
			1	D-60				

Well Completion Log: Sheet 1/2

Boring or Well No. 6D Location Douglas Blvd, north of Bradley Dr.	ProjectTinker AFB IRP Phase II Stage 2 Log Recorded ByW.M. Little
	Log Recorded By Bitter
Construction started 19 June 1984	completed 20 June 1984
Development started 20 June 1984	completed
Development started 20 date 1704	completed 20 June 1984
Total depth drilled (ft)57 feet	
Hole diameter 8 inch	
Drilling methodair rotary	
MICONIOMO OMOGUMACIONA ALLA ALA ALLA ILLA ALLA ALLA ALLA ALL	
Water source for drilling and completion procedures	base supply
Number and type of samples collected Grab samp	les from discharge
Sample interval (ft-ft)variable	
Storage method(s) plastic bags, ambient to	emperature
Casing type Schedule 80 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 47 feet	
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
	namete
Slot size 0.020 inches Scre	en interval (ft-ft) 47-57 feet
Slot size <u>0.020 inches</u> Scre Type(s) of glue used to join casing <u>none</u>	en interval (ft-ft) 47-57 feet
Slot size <u>0.020 inches</u> Scre Type(s) of glue used to join casing <u>none</u>	en interval (ft-ft) 47-57 feet
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand	en interval (ft-ft) 47-57 feet
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page	en interval (ft-ft) 47–57 feet
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific	eninterval (ft-ft) 47-57 feet ation sheet
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage	eninterval (ft-ft) 47-57 feet ation sheet ments
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific	eninterval (ft-ft) 47-57 feet ation sheet ments
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage Source (company and quarry/pit) Arkhola Sand &	eninterval (ft-ft) 47-57 feet ation sheet ments
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frag Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 41-57 feet	eninterval (ft-ft) 47-57 feet ation sheet ments
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage Source (company and quarry/pit) Arkhola Sand &	eninterval (ft-ft) 47-57 feet ation sheet ments
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frag Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 41-57 feet Interval of bentonite seal (ft-ft) 39-41 feet	eninterval (ft-ft) 47-57 feet ation sheet ments
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frag Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 41-57 feet Interval of bentonite seal (ft-ft) 39-41 feet	eninterval (ft-ft) 47-57 feet ation sheet ments Gravel, Ft. Smith, AR
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 41-57 feet Interval of bentonite seal (ft-ft) 39-41 feet Interval of grouting (ft-ft) 0-39 feet	eninterval (ft-ft) 47-57 feet ation sheet ments Gravel, Ft. Smith, AR
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 41-57 feet Interval of bentonite seal (ft-ft) 39-41 feet Interval of grouting (ft-ft) 0-39 feet	eninterval (ft-ft) 47-57 feet ation sheet ments Gravel, Ft. Smith, AR
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 41-57 feet Interval of bentonite seal (ft-ft) 39-41 feet Interval of grouting (ft-ft) 0-39 feet	eninterval (ft-ft) 47-57 feet ation sheet ments Gravel, Ft. Smith, AR
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 41-57 feet Interval of bentonite seal (ft-ft) 39-41 feet Interval of grouting (ft-ft) 0-39 feet	en interval (ft-ft) 47-57 feet ation sheet ments Gravel, Ft. Smith, AR
Slot size 0.020 inches Scre Type(s) of glue used to join casing none Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 41-57 feet Interval of bentonite seal (ft-ft) 39-41 feet Interval of grouting (ft-ft) 0-39 feet	en interval (ft-ft) 47-57 feet ation sheet ments Gravel, Ft. Smith, AR
Slot size	eninterval (ft-ft) 47-57 feet ation sheet ments Gravel, Ft. Smith, AR

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Boring or Well No. 6D Project Tinker AFB IRP Phase II Stage 2 W.M. Little Location Douglas Blvd, north of Bradley Drive Log Recorded By **Construction Schematic** (ft) Static level of water before_ 30 feet _(ft) and after 30 feet (ft) development. 0855 hrs, 20 June 1984 Development started_ Protective casing Development ended 0935 hrs. 20 June 1984 Quantity of water discharged during development 35 gallons Type, size/capacity of pump or bailer used for development -Air lift (drilling rig) with variable discharge Depth of open hole inside well-10. 57 feet Before development___ (ft) 4" Grout 57 feet After development ____ (ft) PVC casind **Development Record** 20. Lithology and Clarity and Odor Grain Size of Conduc-Time Color of of Remarks Removed tivity Discharge Discharge Sediment 0855 <1 gpm flow Red, None Silt. heavy minor fine ∇ Static 30 silt sand water level 0915 ∿1/2 gpm Slowly clearing, begin surging, 1 minute cycles 0935 Red, mod- None Silt. 40 Bentonite erate silt 50-PVC Gravel pack screen 60. D-62

Well Completion Log: Sheet 1/2

Boring or Well No. 6E	Project Tinker AFB IRP Phase II Stage 2
Location Douglas Blvd. at Entry Road A	Log Recorded By W.M. Little
Construction started 19 June 1984	completed 19 June 1984
Douglanmant started 10 Tune 100/	completed 20 June 1984
Total depth drilled (ft) 115 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems appointered during difficult page.	
Water source for drilling and completion procedures	s_base supply
Number and type of samples collected Grab sam	mples from discharge
Sample interval (ft-ft)variable	
Storage method(s) plastic bags, ambient	temperature
Casing type Schedule 80 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 105 feet	
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
Slot size 0.020 inches Sci	reen interval (ft-ft) 105-115 feet
Type(s) of glue used to join casing <u>none</u>	
Type of group party and 0 10 and	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used <u>see next page</u> Grain size distribution of gravel pack. See specific	
Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock fra	
Source (company and quarry/pit) Arkhola Sand 8	
Godies (company and quarry/pit)	graver, rt. Smith, Ak
Interval of gravel pack (ft-ft) 99-115 feet	
Interval of bentonite seal (ft-ft) 97-99 feet	
Interval of grouting (ft-ft) 0-97 feet	
Description of security measures 8 inch steel pr	rotective casing and lid; secured with padlock
Padlock ID No. Master 3213	TAFR/SCR DEED Radian
D-63	Location of key(s) TAFB/SGB, DEEP; Radian
D-03	

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Boring or Well No. 6E					Project Tinker AFB IRP Phase II Stage 2							
Lo	cation_	ougl	as Blvd and	Entry Road	Α	Log Recorde	ed By W.M.	Little	3			
				7		-	•		,			
	Jonstruc	ction	Schematic									
(ft)					el of water be		60 feet			(ft) and		
	-			after_	60 feet	(f	t) developm	ent		` '		
	├ ,		Protective	Developm	ent started	1455 hrs.	19 June 19	84				
	-		casing	Developm	ent ended	1615 hrs,	20 June 19	184				
0-			<u> </u>	Quantity	of water disc	harged durin	ig developme	nt <u>50</u>	gallo	ns		
	_			Type, size	/capacity of	pump or bail	er used for d	evelopn	nent —			
				Air lit	t (drillin	g rig) with	n variable	discha	rge			
					 							
10-				11	-							
	L				developmer					(ft)		
	_ ^	1	•	After	development	115_1	teet			(ft)		
	├ ^	- 4										
	-	D	Static		Development Record							
60-	-		water level		Clasity	 	Lithology and	·				
	- 4"			Time	Clarity and Color of	Odor of	Grain Size of Removed	Ph	Conduc-	Remarks		
	- PVC c asing		·		Discharge	Discharge	Sediment		tivity			
	_		Grout	19 June								
70-				1455			Silt			Low produc-		
	-				heavy silt					tion		
	_			1530	Over press	ure distur	bs sandpac	k, cea	se dev	eloping.		
	_	İ		no 7				·		. 0		
	-			20 June 1535	Red,	None	Silt			C1 or 1 1		
80-	-			1333	heavy silt					Slowly clean ing ∿1/2 gp		
	-											
	-	l		1615	Moderate	None	Silt					
	_				silt				į			
90		1								l		
90	_	l								I		
:	_											
	-											
	_	-	Bentonite							•		
100	-		_									
	-									l		
Ì	- 4" -		Gravel pack									
Ì	PVC		•									
110	screen									'		
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Well Completion Log: Sheet 1/2

Boring or Well No. 6F	Project Tinker AFB IRP Phase II Stage 2
Location_DPDO Yard	Log Recorded By W.M. Little
	-
Construction started 20 June 1984	
Development started 21 June 198/	completed21_June 1984
Development started 21 June 1984	completed21 June 1984
Total depth drilled (ft)102 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling Sand collap difficulty withdrawing.	se at approx 100 feet traps bit, some
Water source for drilling and completion procedures	base supply
	ples from discharge
Sample interval (ft-ft) variable	
Storage method(s) plastic bags, ambient t	emperature
	Diameter 4 inches
Depth of casing (ft) 92 feet Screen type Schedule 40. PVC mill slot	
Screen type Schedule 40, PVC, mill slot Slot size 0.020 inches Screen	Diameter 4 inches
Type(s) of glue used to join casing none	een interval (ft-ft) 92-102 feet
Typo(a) at gide doed to join dading	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used see next page	
Grain size distribution of gravel pack specifi	cation sheet
Lithology of gravel pack Quartz, trace rock fra	
Source (company and quarry/pit) Arkhola Sand &	
Interval of gravel pack (ft-ft) 89-102 feet	
Interval of bentonite seal (ft-ft) 86-89 feet	
Interval of grouting (ft-ft)0-86_feet	
Description of security measures 8 inch steel pro-	otective casing and lid; secured with padlock
Padlock ID No. Master 3213 L	ocation of key(s) TAFB/SGB, DEEP; Radian
D-65	

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Boring or Well No._ Project Tinker AFB IRP Phase II Stage 2 Location DPDO Yard W.M. Little Log Recorded By Construction Schematic (ft) 82 feet Static level of water before_ 82 feet after_ (ft) development 0900 hrs, 21 June 1984 Development started_ Protective 0940 hrs, 21 June 1984 Development ended_ casing 0-Quantity of water discharged during development_ 20 gallons Type, size/capacity of pump or bailer used for development. Air lift (drilling rig) with variable discharge 4" PVC Grout Depth of open hole inside well-_casing 10-102 feet Before development_ (ft) 102 feet After development _ (ft) **Development Record** 20 Lithology and Odor Clarity and Grain Size of Conduc-Time Color of of Ph Remarks Removed tivity Discharge Discharge Sediment 0900 Silt, Red, None ∿1/4 gpm heavy minor fine 80 silt sand ∇ Static water level 0910 Begin surging in 1 minute cycles Slowly clearing Bentonite 0940 Moderate None Silt 90silt Gravel pack 4" -PVC screen 100-110

D-66

Well Completion Log: Sheet 1/2

Boring or Well No6G	Project Tinker AFB IRP Phase II Stage 2
Location West of Building 3117	Log Recorded By_W.M. Little
	- 109
Construction started 29 June 1984	completed 29 June 1984
Dovolonment start 30 Tune 100/	completed 30 June 1984
- QO foot	
Total depth drilled (ft) 90 feet	
Hole diameter 8 inch	
Drilling method air rotary	
• • •	ading water from approx. 25 feet inhibits
Cuttings.	1 1
Water source for drilling and completion procedures	_base supply
Number and type of samples collected Grab samp	ples from discharge
	Ties IIom discharge
Sample interval (ft-ft)variable	
Storage method(s) plastic bags, ambient t	temperature
Casing type Schedule 80 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 80 feet	
Screen type Schedule 40, PVC, mill slot	Diamete: 4 inches
Slot size 0.020 inches Scre	een interval (ft-ft) 80-90 feet
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used see next page Grain size distribution of account to see specific	
Grain size distribution of gravel pack see specifi	
Lithology of gravel pack Quartz, trace rock fra	
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft)76-90 feet	
Interval of bentonite seal (ft-ft) 73-76 feet	
Interval of grouting (ft-ft)	
micral of grouning (iter)	
Description of security measures 8 inch steel pro	otective casing and lid; secured with padlock
	otective casing and iid; secured with padlock
Padlock ID No. Master 3213	ocation of key(s) TAFB/SGB, DEEP; Radian
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Boring or Well No. 6G Project Tinker AFB IRP Phase II Stage 2

Location West of Building 3117 Log Recorded By L.N. French

-	Construction	Schematic									
(ft)	_		!!	el of water be	-				(ft)	and	
-			lf .	81 feet		t) developm	ent				
		Protective	14	nent started_		, 30 June :					
	F	casing		nent ended		, 30 June 1					
0-			Quantity	Quantity of water discharged during development 35 gallons							
	-		Type, size/capacity of pump or bailer used for development								
			Air lift (drilling rig) with variable discharge								
	L		Depth of	open hole ins	ide well						
10-	- 1		ll '	e developmer						(ft)	
	-]	1.	1	development							
	F 7 1	T I	1	acreiopinent						(11)	
	}	7									
40-	4''	Grout			Develop	ment Record					
40	PVC			Clarity and	Odor	Lithology and Grain Size of	-				
	casing		Time	Color of Discharge	of Discharge	Removed	Ph	Conduc- tivity	Rema	rks	
	-				,	Sediment					
	-]	0730	Red, very	None	Silt, fine sand			Very lo	W	
50-	<u> </u>			heavy silt		line sand			flow.		
	-			Flush casi developme		ve materia	insid	e, res	ume		
	-		0740	Begin surg	ing, low f	low, slowly	olean	ing.			
60	-		0805	Moderate	None	Silt,					
	-			silt		minor					
	-					fine sand					
į	-		0010	27 1	7	, .					
	-		0810	No change,	cease dev	eloping.					
70-	-										
	-										
	-	Bentonite									
	-	–									
	-										
80-	- _{4''} - ▽	Static									
	PVC	water level	i								
	screen		1								
		Gravel pack									
	-										
90–		_									
	_										
							·				
[D-68						

Well Completion Log: Sheet 1/2

Boring or Well No. 7A	Project Tinker AFB IRP Phase II Stage 2
Location 30 ft. north of SE 59th St., 75 ft. east of unnamed tributary of	Log Recorded By L.N. French
Soldier Creek	
Construction started 11 July 1984	completed12 July 1984
Development started 12 July 1984	completed 12 July 1984
Total depth drilled (ft) 110 feet	
Hole diameter 8 inch	
Problems appropriated decises delice Mana	
Problems encountered during drilling None	
Water source for drilling and completion procedures	base supply
Number and type of samples collected <u>Grab sam</u>	ples from discharge
Sample interval (## ##) warrighte	
Sample interval (ft-ft) <u>variable</u> Storage method(s) <u>plastic bags</u> , ambient	temperature
ctorage method(s)	remperature
Casing type Schedule 40 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 97 feet	
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
Slot size 0.020 inches Scr	een interval (ft-ft) 97-107 feet
Type(s) of glue used to join casing none	
Type of according to the control of t	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used <u>see next page</u>	
Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock fra	cation sneet
Source (company and quarry/pit) Arkhola Sand &	Gravei, Ft. Smith, AR
Interval of gravel pack (ft-ft)78-107_feet	
Interval of bentonite seal (ft-ft)	
Interval of grouting (ft-ft) 0-77 feet	
Description of security measures 8 inch steel pr	otective casing and lid; secured with padlock
Padlock ID No. Master 3213	ocation of key(s) TAFB/SGB, DEEP; Radian

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Well Completion Log: Sheet 2/2

Boring or Well No. 7A Project Tinker AFB IRP Phase II Stage 2 Location See Sheet 1 Log Recorded By L.N. French **Construction Schematic** (ft) (ft) and after____ (ft) development _ 12 July 1984 Development started____ Protective 12 July 1984 casing Development ended___ 200 gallons 0 Quantity of water discharged during development____ Type, size/capacity of pump or bailer used for development -Air lift (drilling rig) with variable discharge Depth of open hole inside well_____ 4" 10-Before development_____ (ft) PVC After development _____ casing **Development Record** 60. Lithology and Clarity and Grout Odor Grain Size of Conduc-Time Color of of Ph Remarks Removed tivity Discharge Discharge Sediment 7:30a None Turbid, Silt, Start redtrace development 70 brown very fine sustained sand rate of 1 Static gpm ∇ water level 8:15a Turbid. None Little Bentonite red-brown silt, no 80 sand 9:30a Cloudy, None Trace Stop develop light red silt ment Gravel pack 90 100+ - PVC screen Collapse

D - 70

Well Completion Log: Sheet 1/2

Boring or Well No. 7B	Project Tinker AFB IRP Phase II Stage 2
Location 200 ft. north of SE 59th St.,	Log Recorded By L.N. French
200 ft. west of unnamed tributary of Soldier Creek	
Construction started11 July 1984	completed 11 July 1984
Davidson and the same of the s	completed 11 July 1984
Total depth drilled (ft) 45 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling none	
Water source for drilling and completion procedures	no water used
Number and type of samples collected Grab samp	ples from discharge
Sample interval (ft-ft)variable	
Storage method(s) plastic bags, ambient t	:emperature
Casing type Schedule 40 PVC, flush joint Depth of casing (ft) 35 feet Screen type Schedule 40, PVC, mill slot Slot size 0.020 inches Screen Type(s) of glue used to join casing none	Diameter 4 inches een interval (ft-ft) 35-45 feet
Type of gravel pack used 8-12 sand	
Amount of gravel pack used <u>see next page</u>	
Grain size distribution of gravel pack see specific	
Lithology of gravel pack Quartz, trace rock frag	
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft) 30-45 feet Interval of bentonite seal (ft-ft) 29-30 feet	
Interval of grouting (ft-ft) 0-29 feet	
interval of grouting (11-11)	
Description of security measures 8 inch steel pro	otective casing and lid; secured with padlock
Padlock ID No. Master 3213 Lo	ocation of key(s) TAFB/SGB, DEEP; Radian
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Well Completion Log: Sheet 2/2

				11011 00	mpiction.	Log. On				
Во	oring or \	Well	No. 7B		~	Project Tin	ker AFB IR	P Phas	e II St	tage 2
Lo	cation_	see	sheet 1	Log Recorded By L.N. French						
H	Construc	ction	Schematic	7						
(ft)	_	•					below lan			(ft) and
	-		_	after 39.8 feet bls (ft) development						
	[[Protective casing	Developm	nent started _ nent ended	11 J	uly 1984			
0 -				II			ng developme	ent2	0 gallc	ons (est.)
				Type, size	capacity of	pump or bai	ler used for d	levelop	ment —	
	-			Air lift	(drilling	rig) with	variable (discha	rge	
10_	-			Depth of	open hole ins	ide well				
-0_	4'' PVC		Grout							(ft)
	casing			After	development					(ft)
	<u> </u>									
20_	_				1		ment Record			
	-			Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks
				9:00a	Turbid, red-brown	None	Silt			Start devel-
30-	-		Rentonite		red-brown					opment (0.5 gpm continuous)
	- 4"- PVC screen	▽	Static water level	9:20a	Cloudy, red-brown	None	Silt			Sharp de- crease in pumping
40-			Gravel pack							rate; pause in pumping to allow for water-level
50 -	- - - -			10:30a	Cloudy	None	Some silt			Continued docrease in discharge; stop develorment.
	- -									

D-72

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Well Completion Log: Sheet 1/2

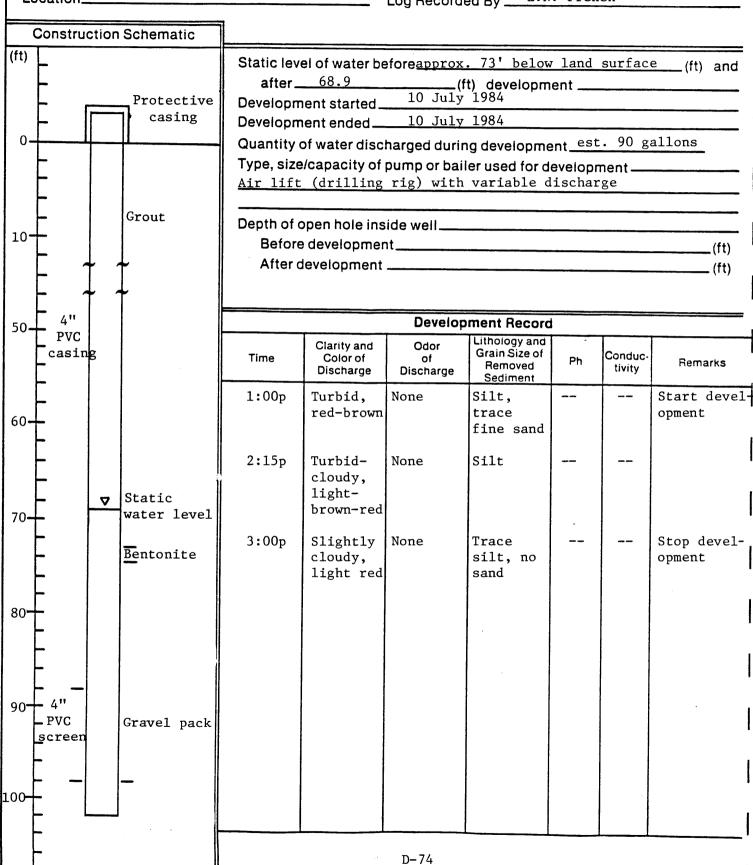
Boring or Well No. 7C	Project Tinker AFB IRP Phase II Stage 2
Location 375' north of SE 59th St.,	Log Recorded By L.N. French
75' west of unnamed tributary of Solider Creek	Log necolded by
Solider Creek	
Construction started 10 July 1984	completed10 July 1984
Development started 10 Tuly 109/	completed 10 July 1984
	completed
Total depth drilled (ft) 102 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling None	
Water source for drilling and completion procedures _	no water used
Number and time of according to the Crab comp.	
Number and type of samples collected <u>Grab samples</u>	les from discharge
Sample interval (ft-ft) variable	
Storage method(s) plastic bags, ambient to	amnaratura
otorago method(s)	smber acure
Casing type Schedule 40 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 88 feet (below land sur	face)
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
Slot size 0.020 inches Scree	en interval (ft-ft) 88-98 feet.
Type(s) of glue used to join casing <u>none</u>	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used see next page	
Grain size distribution of gravel pack see specific	
Lithology of gravel pack Quartz, trace rock frag	
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smith, AR
7/ 5 00 5	
Interval of party in and (ft-ft) 74.5-98 feet	
Interval of prouting (ft ft) 73-74.5 feet	
Interval of grouting (ft-ft)0-73_feet	
Description of security measures 8 inch steel prot	tective casing and lid; secured with padlock
Padlock ID No. Master 3213	TARRIAGE DEED B 11
	ocation of key(s) TAFB/SGB, DEEP; Radian
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Well Completion Log: Sheet 2/2

Boring or Well No. 7C Project Tinker AFB IRP Phase II Stage 2

Location see sheet 1 Log Recorded By L.N. French



Well Completion Log: Sheet 1/2

Boring or Well No. 7D	Project Tinker AFB IRP Phase II Stage 2
Location West edge of Landfill 6	Log Recorded By W.M. Little
	203.1000.100.27
00 7 100/	
	completed 29 June 1984
	completed 29 June 1984
Total depth drilled (ft) 75 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling none	
Water source for drilling and completion procedures	hace cunnity
	base supply
Number and type of samples collected Grab samp	oles from discharge
Sample interval (ft-ft) <u>variable</u>	
Storage method(s) plastic bags, ambient to	emperature
Schodulo An Dug Flush issue	
Casing type Schedule 40 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 65 feet	
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
Slot size 0.020 inches Scre	een interval (ft-ft) 65-75 feet
Type(s) of glue used to join casing none	
Type of ground and house 1 0 10 and 1	- -
Type of gravel pack used 8-12 sand	
Amount of gravel pack used see next page Grain size distribution of gravel and see specific	
Grain size distribution of gravel pack see specific	ation sheet
Lithology of gravel pack Quartz, trace rock frag	ments
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft)64-75_feet	
Interval of bentonite seal (ft-ft) 60-64 feet	
• • • • •	
Interval of grouting (ft-ft)0-60_feet	
Description of security measures 8 finch steel are	
Description of security measures 8 inch steel pro-	tective casing and lid; secured with padlock
Padlock ID No. Master 3213	TAED/COD DEED D 1
LO	ocation of key(s) TAFB/SGB, DEEP; Radian
D-75	

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Well Completion Log: Sheet 2/2

	_		No. 7D				ker AFB IRF			age 2
Lo	cation_	WEST	of Landfill	-		Log Records	ed By W.M.	LICCI	-	
	Construc	tion	Schematic							
(ft)	- - - r		¬ Protective	after_	el of water be 57 feet nent started_	(f 0935 hrs,	t) developm 29 June:1	ent 984		(ft) and
0-	-		casing	Development ended 1035 hrs, 29 June 1984 Quantity of water discharged during development 35 gallons						
	- -			Air lif	Type, size/capacity of pump or bailer used for development Air lift (drilling rig) with variable discharge					
10-	-			Depth of open hole inside well Before development 75 feet (ft) After development 75 feet (ft)						
20-	- 4'' PVC					Develop	ment Record			
	_casing			Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks
30 -	-		Grout	0935	Red, mod- erate silt	None	Silt			Production apprx. 1 gpi
	- -			0955	Moderate silt	None	Silt			Production slows to <1/2 gpm
40-	-			1.005			in surging			
	-			1035	Moderate s	ilt; cease	developme	it.		
50-	-									
60-	- -	▼ =	Static water level							·
30	- - -		Bentonite							
70_	- 4" - PVC -screen		Gravel pack							
					D	-76			<u></u>	

Well Completion Log: Sheet 1/2

Boring or Well No. 7F	ProjectTinker AFB IRP Phase II Stage 2
Location North edge of Landfill 6	Log Recorded By W.M. Little
	209.1000.000 27
Construction started 22 June 1984	completed22 June 1984
Development started 22 June 1984	completed 22 June 1984
Total depth drilled (ft) 25 feet	
Hole diameter 8 inch	
Drilling method all rotary	
Problems encountered during drilling	·
Water source for drilling and completion procedures _	base supply
Number and type of samples collected Grab samp1	les from discharge
-	
Sample interval (ft-ft) <u>variable</u>	
Storage method(s) plastic bags, ambient te	emperature
Casing type Schedule PVC, flush joint D	Diameter 2 inches
Depth of casing (ft)	
Screen type Schedule 40, PVC, mill slot	Diameter 2 inches
Slot size 0.020 inches Scree	en interval (ft-ft) 15-25 feet
Type(s) of glue used to join casing none	
The of accordance of the control of	
Type of gravel pack used 8-12 sand	
see next page	
Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frage	ation sheet
Source (company and quarry/pit) Arkhola Sand & (ments
Course (company and quarry/pit)	Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft) 12-25 feet	
Interval of bentonite seal (ft-ft) 10-12 feet	
Interval of grouting (ft-ft)0-10_feet	
Description of security measures 8 inch steel prot	
	tective casing and iid; secured with padlock
Padlock ID No. Master 3213 Loc	cation of key(s) TAFB/SGB, DEEP; Radian
D-77	

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Well Completion Log: Sheet 2/2

			No. 7F h edge of La			Project Tin				tage 2	
С	onstru	ction	Schematic								
(ft)	- [Protective casing	after_ Developm Developm	16 fe nent started_ nent ended_	et (f 1012 hrs, 1032 hrs,	t) developm 22 June 19 22 June 19	nent 84 84		(ft) and	
	-		Grout	Type, size	of water disc e/capacity of (drilling	pump or bail	er used for a	levelopi	nent —	ons	
10	- - - -	D II	Bentonite Static water level	Before	open hole ins e developmer development	nt2	5 feet			(ft)	
20	- 2'' - PVC		Gravel pack	Development Record							
	scree	n		Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks	
	- - -			1012	Red-brown heavy silt Slowly cl	determined	Silt			Wearing respirators	
	- - -			1032	Clear		None			Production approx 1/2 gpm	
- - - - -	•						·				
	• • •										
+	• •									·	
					D-	-78					

Well Completion Log: Sheet 1/2

Boring or Well No. 7G	Project Tinker AFB IRP Phase II Stage 2			
Location East edge of Landfill 6	Log Recorded By_			
	<u>.</u>			
Construction started 21 June 1984	completed	22 June 1984		
Development 1 1 22 7 100/	completed			
	Completed	22 Julie 1904		
Total depth drilled (ft)30 feet		,i		
Hole diameter 8 inch				
Deilling make a sir rotory				
Problems encountered during drilling None				
Water source for drilling and completion procedures	base supply			
Number and type of samples collected Grab samp	oles from discharge	<u>e</u>		
Sample interval (ft-ft)variable				
Storage method(s) plastic bags, ambient t	emperature			
Casing type Schedule 80 PVC, flush joint Depth of casing (ft) 13 feet	Diameter	2 inches		
Screen type Schedule 40, PVC, mill slot	Diameter	2 inches		
Slot size 0.020 inches Scre	en interval (ft-ft)	13-28 feet		
Type(s) of glue used to join casing <u>none</u>				
Type of gravel pack used 8-12 sand				
Amount of gravel pack used <u>see next page</u> Grain size distribution of gravel pack see specific	cation shoot			
Grain size distribution of gravel pack see specific Lithology of gravel pack Quartz, trace rock frag				
		1.7		
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smill	AR		
Interval of gravel pack (ft-ft)10-28 feet				
Interval of bentonite seal (ft-ft)				
Internal of annuality of the				
Description of security measures 8 inch steel pro	otective casing an	d lid; secured with padlock		
2010				
Padlock ID No. Master 3213 Lo	ocation of key(s) TAF	B/SGB, DEEP; Radian		
D-79				

Well Completion Log: Sheet 2/2

7G Project Tinker AFB IRP Phase II Stage 2 Boring or Well No.

Boring or Well	No edge of Land	1f111 6		Project 11ni Log Recorde				age 2
Construction		1		Log Recorde	еа ву			
ft)	Schematic		vel of water be					(ft) and
	Protective casing	Developn	nent started_ nent ended_	0840, 22	June 1984 June 1984	ent		
		Type, size	of water disc e/capacity of t (drilling	pump or bail	er used for d	evelop	ment	
	Bentonite	Depth of	open hole ins	ide well				
▼	Static water level	1	e developmer development					(ft)
2" 20 PVC	Gravel pack			<u> </u>	ment Record	<u> </u>		
-screen	·	Time	Clarity and Color of Discharge	Odor of Discharge	Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks
30	Collapse	0840	Red, heavy silt	Not deter	- Silt			Wearing respirator Initial productior approx. 14
- - -		0850	Lighter color & turbidity					Production slows to approx.
<u> </u>		0900	Light grey-red silt		Silt			
E								
-								

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APPENDIX E
Raw Field Data



Sediment Sampling

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Monitor Well Sampling



CORPOR	ATION				CALC. NO				
SIGNATURE			DA	TE		CHECK	ED		DATE
PROJECT_						JOB NO.			
SUBJECT						. SHEET.		OF_	SHEETS
Well Number	Depth to Water	Depth to Bottom	Stickup (inches)	:		Field		•	
6G	84.67	93.07	3.13	7/16/84	11.4 9.4 7.7	840 420	20	DHG/NPS	Well water very turbid. Much sediment.
				Sample	7.9	320			Approximately 15 gallons bailed by hand. The 3 measurements of ph and conduc-
									tivity refer to the first 3 5-gallon bucket- fulls.
6D	32.94	59.00	2.94	7/16/84	7.4 6.8 7.0	340 330 330		DHG/NPS	Measurements taken at approx- imately 5 gallon
				Sample	7.0				intervals. 22 gallons purged prior to sampling.
** ** ** 7 F *** **	19.20	28.45	3.25	7/71/84 Sample	6.3	900	18	DGH/NPS	Very redhigh sediment.
7G	12.97	31.4	2.54	7/18/84	6.5	190	18	DHG/NPS	Very redhigh sediment.
6 A	60.00	80.45	3.53	7/18/84	6.5-7	345	21		
6B	67.28	92.68	3.01	7/18/84	6.5-7	460	20	NPS/DHG	
6C	69.69	85.28	2.20	7/18/84	6.5-7	750	19.5	NPS/DHG	Pump broke at approximately 2 well casings; bailed the rest.
6G	85.00	93.32		7/30/84	8.1	560		NPS/DHG	Field dupli- cate. After
				E	-33				evacuating approximately 10 gallons, well pumped dry. Waited for well to recover and then sampled (approximately 45 minutes). 601, 624/625.



CORPORATION	CALC. NO.				
SIGNATURE	DATE	CHECKED	DATE		
PROJECT		JOB NO			

SUBJECT			•			. SHEET.		OF	SHEETS
Well Number	Depth to Water	Depth to Bottom	Stickup (inches)	Date	Field ph	Field Cond.		Sampler	Comments
6E	63.11	115.55		7/30/84	7.4	490	18	NPS/DHG	Pumped 100 gal. before sampling.
6 F	84.15	105	2.61	7/30/84	7.2	720	18	NPS/DHG	pH=7.1, C=740 @ 18 gal. Pumped 40 gal. before sample. 601, 624/625. Left to go set up next well and DPDO closed so grabbed sample first thing on 7/31/84.
7C	72.40	101.5	2.93	7/30/84	7.1	420	17	NPS/DHG	601, 624/625.
7A	79.18	108.8	3.60	7/31/84	7.2	590	17	NPS/DHG	@ 33 gal., pH= 7.1, C=590. 55 gal. evacu- ated. 601, 624/625.
6D	32.85			7/31/84	7.2	590	18	NPS/DHG	Field duplicate for 601, 624/625. @ 15 gal. pH = 7.2, C=600. @ 30 gal., pH=7.2, C=600.
2A	39.46	48.97	3.0	7/31/84	6.6	960	18.5	NPS/DHG	@ approximately 8 gal., pH=6.7, C=960. Approximately 20 gal. evacuated. 601 only.
6C	69.74			7/31/84	7.2	700	19	NPS/DHG	30 gal. evacu- ated. 601 only.
7 F	20.36			7/31/84	6.6	1400	19	NPS	20 L evacuated.
6A	60.00			8/1/84	6.5 E-34	440	20	NPS/DHG	101.40 gal. evacuated.



CALC. NO.

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SUBJECT_						SHEET.		OF	SHEETS
Well Number	Depth to Water	Depth to Bottom	Stickup (inches)	Date	Field ph	Field Cond.		Sampler	Comments
7 G	13.03			8/1/84	6.0	250	17	NPS/DHG	@ approximately 25 gal., pH=6.8, C=620.
6B A	Aprx. 67			8/1/84	6.8	640	19	NPS/DHG	@ approximately 35 gal., pH=6.8, C=600. 50 gal. evacuated. 601.
6D	32.9			8/1/84	7.2	580	18	NPS/DHG	@ 15 gal., pH= 7.2, C=590. @ 28 gal., pH= 7.2, C=580.
6G	84.69			8/1/84	7.7	530	19	NPS/DHG	Pumped dry @ approximately 12 gallons. Waited 20 min. for recovery. 601.
6E	62.88			8/14/84	7.3	450		DHG/AES	
6 F	83.89				7.1	740			
7C.	72.24			8/14/84	7.6	420		DHG/AES	
7A	79.17			8/15/84	8.8	570		DHG/AES	
7C	72.37			8/15/84	7.2	440		DHG/AES	



Base Well Measurements



			CALC. NO.
SIGNATURE_ W.M. Little		CHECKED	DATE
PROJECT Tinker AFB IRP Phase II,	Stage 2	JOB NO. 212-027-21-	01

SUBJECT_Depth-To-Water Measurements, Base Wells SHEET_ OF____SHEETS

Well No.	Date	Depth to Water (ft)	Height of Measuring Point (inches)	Comments
16	10/1/84	235'	15 1/2	Cascading water interferes with measurement.
15	11	220'	20 1/2	do.
14	11	- -	-	No access.
1.7		205' 4"	2	Open casing.
18		100' 8 1/4"	4	do.
19	11	240' 8"	4	do., sound of cascading wate
13	10/8/84		· · · · · · · · · · · · · · · · · · ·	No access.
12			· • · · · ·	No access.
11	!!	260' 5"	10	
20	i ;	310' 18 1/2"	7	
21	en de voor voor in de Hamai anderen a	230' 8"	8	
17	••••••••••••••••••••••••••••••••••••••	205' 26"	2	Re-measurement.
22	10/15/84		.	No access.
23		230' 23 1/4"	7	Cascading water.
24	•		-	No access.
25			-	do., access port plugged.
26	44			do.

1-81-3361



Report of Base Surveyors



DEPARTMENT OF THE AIR FORCE

2854TH CIVIL ENGINEERING SQUADRON (AFLC) TINKER AIR FORCE BASE, OKLAHOMA 73145

REPLY TO

DEEE (Sgt Deguzman, 42868)

21 Aug 84

Subject: Elevation Survey of IRP Phase II, Stage 2 Wells (Your Ltr, 2 Aug 84)

TO: USAFH/SGB

Results of wells survey, as per your request, is found on Attachment 1.

DAVID A. BURRIS, Chief

Engrg & Envmtl Planning Branch

2 Atch

1. Well Elevations

2. USAFH/SGB Ltr, 2 Aug 84



DEPARTMENT OF THE AIR FORCE USAF HOSPITAL, TINKER (AFLC) TINKER AIR FORCE BASE, OKLAHOMA 73145

2 AUG 1384

REPLY TO

1733 LB UB

SGB

Elevation Survey of IRP Phase II, Stage 2 Wells

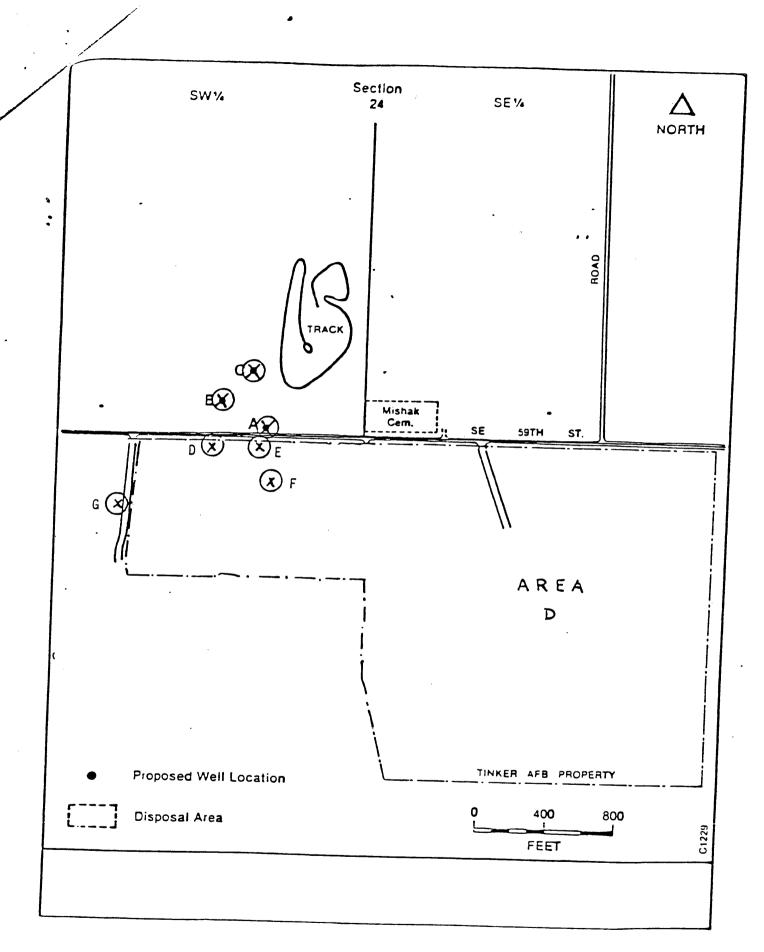
2854 CES/DEE

Radian Corp requests that absolute well elevations surveys be obtained by 22 Aug 84 for the six on-base wells shown on attachment one. Similarly, they request that absolute elevations be obtained for the seven wells shown on attachment two. These wells rise about three feet above the ground surface and are approproximately eight inches in diameter. This data is needed to verify groundwater flow direction. Questions regarding this request should be addressed to Capt Cornell at ext 47844.

DAVID W. McELWEY, Lt Col, USAF, BSC Chief, Bioenvironmental Engineering Division

2 Atch:
1)On-base well locations
2)Off-base well locations

£ 2 AUS RECA



Atch Z3

3-39

Figure 3-10. Zone 6 (Building 3001 Wells).

E-46

ALLZ'

FEET

WELL	ELEVATION
WELL "A"	1277.73'
WELL "B"	1281.68'
WELL "C"	1272.30'
WELL "D"	1282.55'
WELL "E"	1280.99'
WELL "F"	1280.48'
WELL "G"	1300.00'
WELL "H"	1271.91'
WELL "I"	1256.15'
WELL "J"	1271.58'
WELL "K"	1270.22'
WELL "L"	1271.03'
WELL "M"	1287.29'



APPENDIX F

Sampling and Analytical Procedures



Field Procedures



QUALITY ASSURANCE

The bulk of the field sampling procedures were presented in Section 3.0 of the report. The purpose of this Appendix Section is to describe the quality control and quality assurance aspects of the field program.

Many of the traditional quality assurance techniques (duplicate or spiked samples, for instance) are designed to test instrument or analyst performance and do not address the needs of a field program of monitoring well installation. In lieu of such techniques, field practices are built around a principal of "do it right the first time", and procedures are developed to insure this. The three main elements of the field QA program are:

- Record-keeping;
- Peer review; and
- Technical staff management review.

Eash is discussed below.

Record-Keeping

Each supervising geologist kept field notes as the coring and well installation activities progressed. In addition, the drilling subcontractor's team chief also kept field notes. These two sets of notes were compared to develop the logs of drilling activities shown in Appendix D. Discrepancies were resolved by reference to the geologic samples collected.

Ground-water samples were collected in accordance with a written list. The servicing laboratory prepared sample containers and provided them to the field team, who were working from the same list. After the samples were logged into the laboratory, the log-in sheets were compared against the original analytical schedule. All samples were shipped or hand-carried to the laboratory, accompanied by chain-of-custody forms (Appendix G).



Peer Review

Each of the supervising geologists served overlapping tours of duty in the field. This provided all with the opportunity to participate in broad portions of the study, rather than focusing on a single zone. Each person overlapped with his successor to insure a smooth transition. Once the field effort was concluded, the supervising geologists were assigned to write up separate zones. These writing assignments provided for close coordination with other members of the field team, so that observations during drilling and sampling were incorporated into the text. After the drilling logs and report text were prepared, they were reviewed for completeness and accuracy by other members of the field team. Thus, each portion of the report was subjected to peer review before entering the formal review process.

Technical Staff Management Review

After the complete report was finalized by the Project Director, it was formally reviewed by a senior member of Radian's technical staff management. This review focused on quality of presentation and soundness of discussion and recommendations.

FIELD EQUIPMENT CALIBRATION

This program utilized very little in the way of field instrumentation. The four items of equipment were:

- pH meter (Corning Model 610A with a combination electrode),
 standardized daily against pH 7.00 and 10.00 or 4.00 buffers.
- Conductivity meter (YSI Model 33), calibrated before deployment against an 800 µmho standard and daily internal calibration check ("red line"):



- Water level probe (Soiltest Model 762A), no calibration required; and
- Threshold Limit Value Detector "TLV meter" (Bacharach Model 23-7231), zeroed with organic-free air and spanned with hexane standards. Not used for emissions level data determinations, but only for field drilling safety.



Laboratory Quality Assurance Program

Quality Assurance/Quality Control
Program
for
Radian Analytical Services



THE QUALITY ASSURANCE/QUALITY CONTROL PROGRAM FOR RADIAN ANALYTICAL SERVICES

Radian Analytical Services' (RAS) objective is to provide high quality chemical analyses to all clients regardless of the size of the analytical task. To aid in achieving this goal, a strong quality assurance program and rigid quality control practices are integral parts of all analyses. This document describes these quality assurance/quality control protocols for the Radian Analytical Services laboratories.

The basic quality control program includes procedures for sample handling, calibration, spiking and replicate analyses, analysis of QC test samples, equipment maintenance, and supplies control. These procedures can be integrated with a client's additional requirements, such as spiking studies, analysis of replicate samples, linearity determinations, and stability studies.

The quality assurance program consists of the frequent submission of blind QA samples, duplicates, and spiked sample splits. Also included are personnel training, analytical methodologies, sample control procedures, data handling, and equipment maintenance and calibrations.



1.0 QA Organization/Policy

The objective of Radian's quality assurance/quality control program is to assure, assess, and document the precision, accuracy, and adequacy of data obtained from chemical analysis and to assure the technical accuracy of the results obtained for all samples.

Radian has organized the quality assurance function within the company to allow complete independence of program review. Radian's Quality Assurance Director reports directly to the Vice President of the Technical Staff. This position provides independent reviews at all levels of the technical staff and laboratory organization and allows immediate access to Radian's top management on QA-related matters.

The QA Director's involvement may be limited to a review of quality control practices or as extensive as active development and implementation of quality control procedures and statistical data analysis. The QA Director may be asked to contribute expertise and assistance when a need is perceived by either the client, the technical staff, or the management staff.

Because of the large number of samples analyzed by RAS, a QA coordinator has been assigned to monitor and maintain an effective QA/QC program for these laboratories. The RAS Quality Assurance Coordinator, directly responsible to the Corporate QA Director, serves as an independent auditor of all RAS laboratories. The responsibilities of the RAS QA Coordinator are as follows:

- Monitor QA/QC within RAS laboratories,
- Supervise the preparation of blind audit samples,



- inform the Director of RAS and the corporate QA Director of quality assurance problems,
- summarize and report QA activities in the laboratories,
- document all QA and QC procedures within RAS,
- act as liaison between the corporate QA Director and RAS,
- provide QA data to the corporate QA Director for inclusion in the corporate QA reports.

The RAS laboratory managers function as the quality control coordinators in each particular analytical area. Their efforts are coordinated and monitored by the QA Coordinator.

Quality control coordinators serve as a focal point for all QC activities pertaining to each RAS laboratory. They work as a committee coordinated by the RAS Quality Assurance Coordinator. Their activities include the following:

- monitor the QA/QC activities of the laboratory area,
- inform the Director of Analytical Services and the QA coordinator of QC problems and needs.
- summarize, document, and report quality control activities and data generated in the laboratory,



- provide documentation of all QC procedures in the laboratory,
- maintains summaries of QC activities and data in a form suitable for client review upon request.

2.0 Quality Control for Laboratory Analyses

Radian Analytical Services has developed and implemented quality control procedures for all of the analyses performed in the laboratory. The laboratory quality control program provides an effective and efficient laboratory protocol for QC regardless of the size or scope of the analytical requirements. Approved analytical methods are used whenever available. When approved methods are not available, a method is developed by the Radian technical staff, and a technical note written describing the method. The quality control procedures are designed to insure that the standard operating procedures and quality control protocols are being followed and accurate results are obtained.

The general quality control program utilized in each laboratory includes consideration of the following areas:

- personnel training and certification,
- analytical methodology documentation,
- sample handling and control,
- laboratory facilities and equipment,
- calibration and standards.
- data handling and documentation,
- quality control check samples.

The general approach to quality control in each of these areas is discussed in the remainder of this section.



2.1 Personnel Training and Certification

The successful implementation of any QA/QC program is determined by the training and dedication of the laboratory personnel. The quality and consistency of data should be independent of the analyst. With the proper training and supervision, an analyst will be able to obtain quality data by the use of proven methodology. Periodic assessment of training requirements and certification are performed to maintain a high level of laboratory awareness.

The training and certification methods employed in the RAS laboratories are briefly described below:

- study of laboratory standard operating procedures,
- study of QA manual,
- observation of experienced operators/analysts,
- study of operating manuals.
- instruction by the laboratory manager on all aspects of the analysis,
- perform the analysis under the direct supervision of the laboratory manager,
- perform analysis under supervision of experienced personnel,
- analysis of blind QC samples prepared by laboratory QC coordinator,
- participation in in-house seminars on laboratory methods and procedures.



PERSONNEL TRAINING RECORD

Employee	_			-			
Employee Number	er _			-			
Date of Employ	yment _			-			
Laboratory Or:	ientatio	n:					
Upon and Laboratory	n comple v Manage	tion of ear	ich pha itial a	se of person nd date the	nnel train: step compl	ing the emp leted.	loyee
•	The RA been r	S laborato	ory Sta Idersto	ndard Opera	ting Proced	lures have	
				Employee 1	Lab Mgr.	Date	
•	the pr	S Quality ocedures f have beer	or the	nce manual l laboratory ined.	nas been re in which t	ead and the employe	ee
				Employee I	ab Mgr.	Date	
•	employ	ee perform ocedures f	s analy	instruments yses have be ration and m	en studied	l and	
Instrument Em	ployee	Lab Mgr.	<u>Date</u>	Instrument .	Employee	Lab Mgr.	<u>Date</u>
					•		
				-			
							
							

Figure 2-1.



Test Specific Training:

Each specific test performed in the RAS laboratories involves procedures which may be unique. The steps involved in training an employee are:

- <u>Instruction</u> by the Laboratory Manager on all aspects of the analysis,
- <u>Observation</u> of experienced operators/analysts,
- <u>Perform the analysis</u> under supervision of the laboratory manager,
- Perform analysis of QA samples submitted by the QA coordinator, and
- Participation in in-house <u>seminars</u> on laboratory methods and procedures.

The following table is to be completed by dating and initialing by the employee and Laboratory Manager upon completion of each step.

Method	Instruction	Observation	Perform the Analysis	Analysis of QA samples	Seminars
	-				
		-			



All RAS personnel must complete a quality control training program. This system includes motivation toward producing data of acceptable quality and involves "practice work" by new employees. New personnel are made aware of the quality standards established by RAS and the reasons for those standards. They are made aware of the various ways of achieving and maintaining quality data. After an employee has been trained to use a method and the work validated by the laboratory manager, the employee is certified to perform the analysis. As these people progress to higher degrees of proficiency, their accomplishments are reviewed and then documented. Documentation of proficiency training is maintained by the QC Coordinator for each laboratory technician using the two-page form shown in Figure 2-1.

2.2 <u>Analytical Methodologies</u>

All analytical procedures followed in the RAS laboratories are documented in a methods manual for the specific laboratory. A set of standard operating procedures (SOP) has been established for each analysis to insure consistency. Most methods used are directly from an approved analytical manual, e.g., EPA methods, APHA Standard Methods for Water and Wastewater, ASTM, etc.

Methodologies may contain the following information:

- method title,
- scope of method,
- summary of interferences, and applications,
- concentration ranges and detection limits,
- safety precautions,
- required equipment and materials,
- standardization directions,
- detailed analytical procedure,
- calculations, with examples,
- reporting method.
- precision and accuracy statement,
- references.



2.3 Sample Control and Record Keeping

The Radian Analytical Services Sample Control Center is a controlled access area. Only employees of the Sample Control Center have access to sample receiving, sample storage, documentation files, and the computer terminals. Analysts check out samples under the supervision of the sample control personnel. All samples are stored in locked storage areas. Sample tracking is maintained by a computerized laboratory management system and a sample checkout logbook. The RAS Sacramento laboratory is linked to the central processing unit of the computer in Austin via a dedicated phone line. This insures that the laboratories are in constant communication. All sample information and data entries can be immediately accessed at either location.

Detailed record keeping and control of samples are essential for effective laboratory operation. All samples received for analysis in the Radian Analytical Service laboratories are processed through the Sample and Analysis Management System (SAM). Radian Corporation's SAM is a software and hardware system for controlling and handling information for the analytical laboratory. SAM provides a dynamic, easy-to-use method for tracking, scheduling, reporting, and laboratory management. The system has been designed to accommodate and promote good laboratory management practices by providing high visibility of the information laboratory managers need to make good decisions regarding schedules and priority. The system is designed around a Data General Nova-IV computer with a 64K-byte memory. It also includes a 65M-byte disk drive and a line printer with plotting capabilities. Data is entered via a TEC terminal and CRT. All data stored on the disk is backed up on magnetic tape to prevent loss in the event of a system malfunction. The system is designed so that an individual designated as the principal operator can process the required paperwork for a large laboratory with little difficulty. The approach centralizes information input and data retrieval, and provides the mechanism for organized, up-to-date laboratory performance monitoring.



SAM maintains complete client information files, generates laboratory status reports, flags sample analyses which are overdue, accepts analysis results manually or automatically, and generates reports and invoices.

The Sample Control Center and SAM have six basic functions:

- sample receipts and logging,
- sample storage and maintenance of sample integrity.
- laboratory status reporting,
- document control,
- data compilation and reporting, and
- invoicing.

In order to assure the integrity of a sample and the accompanying documentation, a security plan has been established. This plan consists of three parts:

- chain of custody,
- secured refrigerated storage, and
- document control.

The progression of samples and documentation through the Sample Control Center and the analytical laboratories is presented in Figure 2-2. Detailed descriptions of each sample control function are presented below:

- Samples are received from the commercial carrier at Radian's shipping and receiving facilities by the receiving clerk.
- Within one hour of arrival, the samples are accepted by RAS sample control personnel.



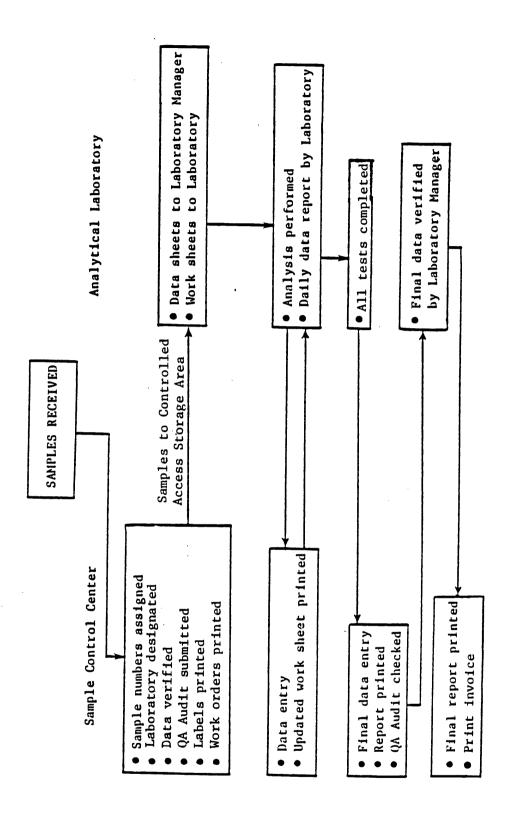


Figure 2-2. SAM Laboratory Management System



- All shipping containers and security seals, when appropriate,
 are inspected for physical damage or evidence of tampering.
- The samples are unpacked in the sample receiving area by the RAS sample custodian. The method of shipment, shipping container integrity, condition of samples, the number of samples/container, integrity of the security seal, and accompanying documentation are noted. Sample identification is verified against custody documents. The enclosed chain-of-custody forms, Figure 2-3, when required, are completed and filed with the shipping and receiving documentation. In the event that peculiarities are noted, the project officer or client is immediately advised of the irregularity.
- Samples are logged into a bound sample logbook, Figure 2-4. Again, sample identity is verified. All discrepancies are noted in the logbook.
- The handwritten logbook and all documentation are transferred to the Sample Control Center.
- The samples are logged into the SAM system. Each batch of samples is assigned a consecutive work order number by the system. Analytical requirements for each sample are entered into the computer.
- Hard copy of the work order and other information is printed and filed with the received documentation in the Sample Control Center.
- Labels are printed and secured to each sample. Label information includes sample number, identification, storage location, and analytical requirements.



CHAIN OF CUSTODY RECORD

•	Field Sample No	
Company Sampled / Address		
Sample Point Description		
Stream Characteristics:		
	Flow	
Visual Observations/Comments	FIOW	pH
Collector's Name	Date/Time Sampled _	
Amount of Sample Collected		
Sample Description		
Store at: ☐ Ambient ☐ 5°C ☐ —	10°C □ Other	
☐ Caution - No more sample available	☐ Return unused portion of sample ☐	Discord variables
	Hazards	
□ Hazardous sample (see below)		
·	☐ Non-hazardou	s sample
□ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
□ Pyrophoric □ Acidic	☐ Lachrymator	☐ Shock sensitive
□ Acidic □ Caustic	☐ Biological	☐ Carcinogenic - suspect
□ Other	☐ Peroxide	☐ Radioactive
Sample Allocation/Chain of Possessio		
Organization Name		
Received By	Date Received	Time
ransported by	l ah Sampia No	
comments		
nciusive Dates of Possession		
Organization Name		
Received By	Date Received	Time
ransported By	Lab Sample No.	
comments		
inclusive Dates of Possession		
Organization Name		
Received By	Date Received	Time
ransported By	Lab Sample No.	
omments		
nclusive Dates of Possession		



		Lab No.		
Company Facility Rep Phone Report to Attn Inv to Attn P.0. # Expires		Quoted \$ Contact Sample \$ Received Misc \$ Date Due Total \$ Samples Inv by (CPR) Keep for % Surcharge Keep til % Disc: All Disp (RD) # Reports # Invoices Work ID Taken Trans Type Condition Comments:		
		ocation:		
Dash No.	Sample Description	Analys	sis Required	QA
				===

Figure 2-4. Sample Log Sheet



- Data sheets and work sheets are printed for each batch of samples and distributed to the appropriate laboratory managers. The work sheets list sample numbers, sample identification, storage location, and analytical requirements. Data sheets are for results and contain only the parameters to be determined by a given laboratory.
- Following sample logging, the samples are placed in the designated locked storage area.
- Subsequent sample custody is documented and all transactions witnessed by sample control personnel.
- The analyst retrieves the samples from the Sample Control Center by sample number and storage location.
- The Sample checkout log (Figure 2-5) is completed by the analyst, noting the laboratory to which the sample is being removed.
- After analysis, or when the required aliquot is removed, the sample is returned to the Sample Control Center and return is noted in the sample checkout log.
- The sample is returned to the designated storage location.
- When requested, addition chain-of-custody documentation can be provided using a SAM-generated document (Figure 2-6). This document can be retained by sample control to provide a more easily retrievable record of sample custody within the analytical laboratory.
- The sample is stored until the assigned time or written permission is given to either properly dispose of or return the sample to the client.

RAS SAMPLE CHECK OUT LOG

			CHECK-00	CHECK-OUT INFORMATION		RE	THEN THEOR	MATTON	
WORK ORDER	SPLITS REMOVED	DATE	TIME	DESTINATION	INITIALS	DATE	TIME INIT	INITIALS	
									78/196
									(water and Prep. Labs)
									78/194
									(Extraction & Water Labs
					*				
									(ICP and AA
									Laus)
									7S/191 (TOX, TCC)
									78/195
		•							(Technician)
									75/171
									(95)

Figure 2-5. Sample Checkout Log

•	
1	S
	1
1	M

PAGE 1 ' RADIAN RCVD: 02/26/83 DUE: 03/19/83

Analytical Serv CHAIN OF CUSTODY 04/21/83 09:56:49

DISP: LAB # 83-02-A67 KEEP: 05/09/83

	PH_A	•	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9		NA_E		HG_CA	TDS A		
	ONG_A	•			MG_E		7E_E	SO4_NA	•	
	HCO3_A MHO_A ONG_A PH_A	•			HCO3_A MG_E NA_E		CR_E	PH_A		
,	HCO3_A MHO_A				FE_E ZN_E		CD_E SE_HA	NO3_A		
	HARD_B TANNIN				CO3_A S_E		BA_E PB_GA	MHO_A		RA_TOT
	CO3_A SO3_TA				CL_TA S04_NA	C_MET	AS_HA NA_E			BETA
TESTS	CAUSTY PO4_B	ACFS	ICP_40	ANFS	CAE	B_MET	AG_E MN_E		HIRCRA	ALPHA
LOCATION	Ref 2	Ref 2	Ref	Ref	Ref 2	Shelf 13	Ref. 023	Ref. 023	Ref. 023	Ref. 023
DASH SAMPLE IDENTIFICATION)1A-B Number 001 Ref	002	002	oil	scale 222	•	#164	#164	#164	#164
SAMPLE	Number 001	Number 002	Number 002	Super soil	Boiler scale	Sample AV56	Water	Water #164	Water #164	Water
DASH	01A-B	02A	02B	03A	04A	05A	06A	890	•	090

FRACTION NUMBERS.	
DATE	
RETURNED TO	
DATE	
RECEIVED BY	

A CONTRACT OF THE PARTY OF THE			

Figure 2-6. Laboratory Chain of Custody



• All documentation, including shipping documents, field sampling documents, computer-generated log sheets, chain-of-custody forms, laboratory data sheets, final computer reports, and other documents, are maintained in the sample control area. All reports are kept in locked filing cabinets. As with the sample storage area, the document storage area is limited-access.

All storage areas are within the Sample Control Center and are locked when not in use. Access to the storage area is limited to sample control personnel or other RAS employees accompanied by sample control personnel. There are four storage locations that are used depending on the sample and the required analyses. They are:

- ambient storage for samples that do not require refrigeration,
- 4°C storage for most samples requiring water quality analysis and extractable organics,
- 4°C storage for samples requiring volatile organic analysis, and
- \bullet -20 $^{\circ}$ C storage for extracts and samples that require freezing.

A temperature log is maintained to monitor the cold storage facilities.

2.4 <u>Laboratory Facilities and Equipment</u>

A clean well-lighted, and well maintained laboratory is essential for accurate analytical results. Each laboratory is well-lighted, air conditioned and equipped with chemical fume hoods. Instrumentation that may emit noxious odors is vented externally.



Quality Control of Equipment and Supplies

Each laboratory QC program includes detailed requirements for equipment and supplies. Reagents, solvents, and standards with specific levels of purity are used as specified by the analytical protocol. Specific GC column materials, glassware and sample handling equipment are also specified. The quality control procedures for equipment and supplies generally include the following items:

- operator checklists for required supplies,
- documentation and reporting of all deviations from specified instrument performance,
- procedures for testing for purity of reagents,
- tolerances for calibrated glassware where applicable,
- monitoring of refrigerated storage space,
- maintenance logbooks,
- service contracts on analytical instrumentation.

Quality control procedures during sample preparation include the preparation of reagent or solvent blanks. Additional quality control techniques implemented in sample preparation include:

- deionized water piped into all laboratories, monitored daily,
- purchasing high purity distilled-in-glass solvents in large quantities from a single lot,



- use of Ultrex acids in trace metal digestion,
- cleaning of organic glassware with chromic acid or firing in a kiln at 450° C.
- cleaning of trace metal glassware with nitric acid,
- use of organic-free water prepared at Radian by distillation over alkaline permanganate under nitrogen atomsphere in allglass still,
- use of volatile-free water prepared by purging organic-free water with nitrogen,
- sample preparation performed by experienced technical personnel under the supervision of senior level analysts.

2.5 Quality Control for Standards and Calibration

The quality of all test results is greatly impacted by the calibration procedures used. Calibration procedures and standards should be specified for all equipment and supplies used in the test procedure. Traceability to common standards is essential for test procedures to be used in multiple laboratories. Quality control procedures for standards and calibrations include the following considerations:

- written, detailed calibration instructions,
- preparation procedures for secondary standards, when applicable,
- requirements for frequency of calibration,
- recordkeeping of all calibrations and standards used,



- quality control charts for recording results from multiple calibrations,
- evaluation of internal standards, and
- tolerances for calibration requirements.

All calibration standards are prepared from NBS-traceable, EPA certified, or primary standard materials. Daily logs are maintained to monitor instrument response to a given standard.

Quality Control Test Samples

Routine quality control samples to be analyzed concurrently with client samples are a significant portion of the RAS laboratory quality control programs. The purpose of these checks is twofold: 1) to assure that samples being analyzed satisfy predetermined standards of accuracy, and 2) to measure and document achieved levels of accuracy and precision.

There are many different types of quality control samples which could be used for these purposes. The correct combination of these will depend on the complexity of the test method and the desired degree of accuracy. The following quality control parameters are general considerations for Radian's quality control for test methods.

Interferences

The analytical results of a test method might be affected by interferences from the glassware, solvents, reagents, or the sample matrix. Blank samples which are subjected to conditions similar to samples being analyzed are used to evaluate the purity of laboratory reagents. The frequency of blank analysis is method dependent. For example, a laboratory or field blank is analyzed after each GC/MS volatile organic analysis with high levels for any of the pollutants. Ten percent of the samples from a



given sample batch are spiked with a known standard. Spike recovery data are calculated to determine matrix interference.

Precision

The precision or repeatability of a test method is required for proper interpretation and weighting of the data. Replicate samples or standards are used to determine the precision on a regular basis. The precision of multiple analyses are compared against predetermined precision limits to determine their acceptability. The precision is usually reported as a standard deviation or repeatability statistic and often depends on the concentration of the parameters analyzed. Replicate analyses are defined as separate digestions or extractions of the same sample, when possible. The percentage difference or range between replicate analyses is also used to monitor precision.

Reproducibility

The reproducibility of a test method refers to the repeatability over a period of time. How well will analytical results repeated a month later agree with today's results? Reproducibility can be measured by the repeated analysis of samples from a previous time period or by analysis by more than one laboratory or laboratory technician.

Qualitative Specificity

In the analysis of complex sample matrices containing multiple components, the use of a single method can lead to misidentification of compounds. The misidentification can be detected by repeated analysis of standards containing the compounds of interest or by independent analysis by a more specific method. For example, mass spectral confirmation can be used to evaluate misidentification problems in the GC laboratory.



2.6 Documentation and Data Handling

Documentation of methods, procedures, and results is an essential aspect of a QA/QC program.

Adequate documentation is required for an instrument maintenance system. RAS laboratories use an individual logbook, which is kept at each instrument, to record all calibration and maintenance activities. This logbook gives a chronology of that instrument's installation, operation, calibrations, maintenance, malfunction, and repairs. An accompanying binder includes all pertinent manufacturing information, service manuals, and similar reference materials.

Directions for calibrations and maintenance, along with appropriate forms and checklists, are maintained in a manual accompanying the logbook. The directions specify the required frequency for calibrations and maintenance, the tolerances for calibrations, and the action to be taken when calibration requirements are not met.

In this system, there is a single source for reference purposes as well as record keeping. All the instrument logbooks are reviewed periodically by the quality assurance coordinator and laboratory manager. A record of these logbook checks is maintained by the QA coordinator.

Work sheets have been developed to insure consistent laboratory data entry for most parameters determined in the laboratories. These sheets are designed to organize the data in a clear and logical manner, and to simplify calculations. The work sheets are divided into various sections including a section for reporting calibration standards and blank values and a section for plotting calibration curves. These work sheets are usually a standard data entry form which the laboratory technician enters in his/her bound lab notebook. When automated calibration is not applicable, electronic calculators are available in the laboratories to generate calibration curves by the method of least squates. Thus errors in reading calibration curves and calculating data are minimized. After an analysis



is completed and a data sheet filled out, the laboratory manager checks the data for completeness and approves the data sheet. After the data have been entered into the SAM system, an updated data sheet is issued to the laboratory manager. When the work is complete, a preliminary report is printed and distributed to the contributing laboratory managers for the final data check and approval. A final report is printed, certified by the laboratory manager, and forwarded to the client.

Proper documentation of quality assurance and quality control activities is an essential requirement. Documentation is needed to demonstrate that quality control activities were completed as scheduled and to communicate the results of the QC tests to laboratory managers and clients. Documentation of QA results is required to provide feedback for improvement of quality control programs.

Quality control documentation should be timely in order for feed-back to occur. Daily reporting to laboratory managers is mandatory. Forms are designed to organize the QC data in a clear and logical manner, and to simplify calculations. Control charts are another excellent tool for summarizing quality control test results.

As part of Radian's QA audit program weekly reports summarizing audit results in the laboratories are prepared and distributed to QC coordinators.

3.0 Quality Assurance Audits

The quality assurance audit program of the RAS laboratories is conducted by the RAS QA Coordinator in conjunction with the corporate QA Director. The program consists of the following:

• QA standards are prepared using EPA certified standards, NBS standards, primary standard materials, and NBS-traceable compounds. All standards preparations are recorded in the QA Sample logbook (Figure 3-1).



		Standard No. QAS
QA type		
Prep date	Prepared by	Verified by
Standard source		ver in red by
Sample matrix		
Parameters		•
· · · · · · · · · · · · · · · · · · ·		
		·
	•	
Preparation method		Final vol

Figure 3-1. Standards preparation logbook



Prep method	i (con't)			
				,
				•
		-		
		Calculatio		
		Calculatio	ns	
		Sample Dist	ribution	
Date	SAM No.	Client	Remarks	
Date	JAN NU.	CITETIL	- Keillarks	
•				

Figure 3-1. (Cont.)



- An inventory of stock standards is maintained within the limits of published stability data. This decreases the time required for daily standard preparation.
- Duplicate samples are requested from clients. These are blind to the laboratory and the client is not billed for the duplicate.
- Blind QA samples are submitted through the Sample Control
 Center to all laboratories. The parameters and concentration
 levels are selected by the RAS Quality Assurance Coordinator.
- Laboratory managers submit, via a "QA Alert Form" (Figure 3-2). a list of the types of QA samples needed the following week. This insures that the parameters with which there have been problems are included in the sample.
- Monthly reports are issued from the RAS QA Coordinator (Fig. 3-3). These are submitted to the corporate QA Director, laboratory managers and Director of RAS. Managers are notified immediately of major problems with the results of analysis of a QA sample.
- The results of the program are summarized on a quarterly basis for Radian's management.

In addition to the continuous audit program, provisions for third party review are made with each client's work. Radian Analytical Services welcomes onsite audits, performance samples, and independent evaluations.



QA ALERT FORM

	QA standard for the week of
NPDES Form A water Form B water metals	RCRA metals pesticide oc OP herbicide
Form C water metals organics	EPA 601 624 625
TOC TOX	B/N Acids A/N MS VOA GC VOA
Matrix requirements:	PCB
Concentration requirements:	
Special Standards/Ins	tructions Individual Parameters
·	
DateMgr	

Figure 3-2. QA alert form



ANALYTICAL SERVICES MONTHLY QA REPORT

QA	prep	report	for	the	month	of`	
----	------	--------	-----	-----	-------	-----	--

Order No.	Lab	Parameter	Certified Value	Analyzed Value	% Recovery	Date Reported
					· · · · · · · · · · · · · · · · · · ·	
	 					
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		•				
			-			

Figure 3-3. Monthly QA Report



3.1 Data Review and Validation

All analysis results are entered into the SAM computer system. Following completion of the analyses, a preliminary report is printed and returned to the appropriate laboratory manager for review and validation. A final report is printed after the certification by the manager. This report is signed and approved by the laboratory manager before being forwarded to the client. The following diagram (Fig. 3-4) illustrates the data flow for a typical sample analysis.

Upon completion of the analysis and before the final data are issued, the results of the QA audit samples are compared to the certified values. These results are plotted on control charts. Separate control charts are maintained for each analysis. If results are outside the accepted control limits, the analytical results are held until the problem is resolved.

3.2 Control Charts

Quality control charts are maintained for both accuracy and precision. Both charts are structured as shown in Figure 3-5. The main portions of the chart are the center line and the two control limits. The center line is the 100% or total recovery/total agreement of analytical results. The upper and lower control limits are calculated from historical data.

Control charts for accuracy are constructed as follows:

Precent recovery of standards (P_{ST}):

 $P_{ST} = 100 \times \frac{\text{analyzed value}}{\text{certified value}}$



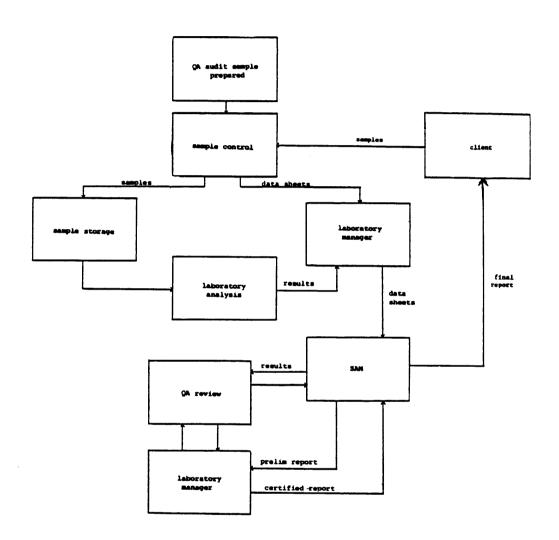


Figure 3-4. Data Flow



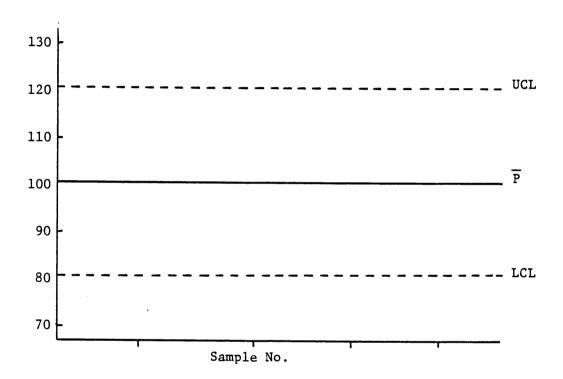


Figure 3-5. Control Chart



Percent recovery of spikes in samples (PSP):

$$P_{SP} = 100 \times \frac{analyzed value - background value}{spike}$$

From a set of analyses, the average percent recovery (\overline{P}) :

$$\overline{P} = \underbrace{\sum_{i=1}^{n} P_{i}}_{p_{i}}$$

The standard deviation for percent recovery (S_R) :

$$S_{R} = \sqrt{\frac{\sum_{i=1}^{n} P_{i}^{2} - \left(\sum_{i=1}^{n} P_{i}\right)^{2}/n}{n-1}}$$

The upper and lower control limits are therefore

$$UCL = \overline{P} + 3S_R$$

$$LCL = \overline{P} - 3S_R$$

An analysis is out of control when either of the two conditions apply:

- 1) Any results outside the control limits
- 2) Seven successive results on the same side of the control line.

Control charts for precision are also constructed. Precision is a function of the concentration range of the analyte. The closer the result is to the analytical detection limit, the more imprecise the data become on a percentage scale. Figure 3-6 illustrates the relationship between detection limit and precision for a typical methodology. Because of this concentration dependence, precision control charts need to be developed for specific concentration ranges for each analyte. For duplicate samples A and B, the ratio of the values of A and B are plotted.



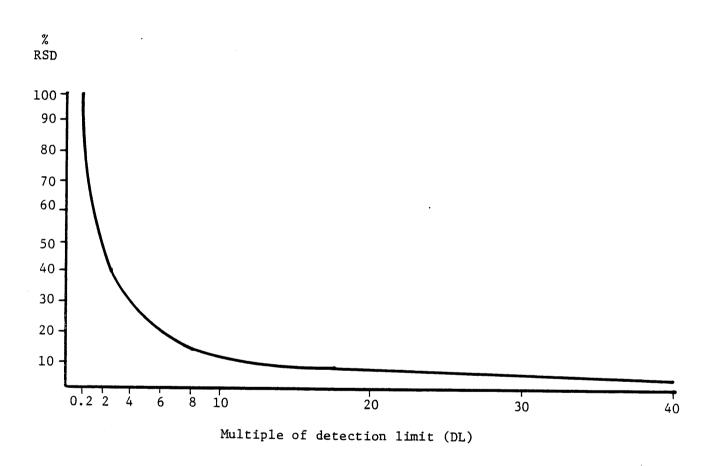


Figure 3-6. Relationship between Detection Limit and Precision



3.3 <u>Concurrent Review</u>

Upon review of analytical results of QA audit samples, the QA Coordinator will schedule a meeting with the laboratory manager if there are any tests out of control or which are deviant from an expected precision/accuracy norm. The purpose of this meeting is to:

- review raw data and determine if there is an explanation for the deviance.
- outline analyses of quality control and/or quality assurance samples to further define the problem and its solution.
- establish a schedule for monitoring the analysis after a solution is implemented, to assure that the problem does not recur.

Involvement of the laboratory manager in the problem assessment and solution is essential to a mutual committment to a quality analytical laboratory.



 $\begin{tabular}{lll} APPENDIX G \\ \\ Chain of Custody Forms \\ \end{tabular}$



		FIELD SAMPLE No. TSED-01
COMPANY SAMPLED/ADDRESS TINK	ER AFB	
SAMPLE POINT DESCRIPTION North S	de culvert under F	atrol Rd - 150' E of Pond Rd.
STREAM CHARACTERISTICS: TEMPERATURE	1.	,
COLLECTOR'S NAME GANCAR2 AMOUNT OF SAMPLE COLLECTED 1 SAMPLE DESCRIPTION SALAR TO STORE AT: AMBIENT \$25		E SAMPLED 19 JURE 84 1040
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLIN		
HAZARDOUS SAMPLE (SEE BELOW)	X Non-hazar	RDOUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC		SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		·
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME RECEIVED BY SAMPLE NO. STOCK OF POSSESS CHAIN OF POSSESS WALLOCATION / CHAIN OF POSSESS WALLOCATION	dolly Comments	Date Received
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME	**	
RECEIVED BY		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

RADIAN

1	450	FIELD SAMPLE No. 1500 02
COMPANY SAMPLED/ADDRESS	er Atb	
SAMPLE POINT DESCRIPTION	hs Greek	
STREAM CHARACTERISTICS:		
TEMPERATURENA	FLOW NA	-u <i>N/A</i>
VISUAL OBSERVATIONS/COMMENTS		creekbed. Gravel bottom
COLLECTOR'S NAME SANCARE	DATE/TIME	Sampled 419/84 1100
AMOUNT OF SAMPLE COLLECTED	L	· · · · · · · · · · · · · · · · · · ·
SAMPLE DESCRIPTION COMPOSITE		lugs
STORE AT: AMBIENT 5°C	10°C OTHER	3
CAUTION - No MORE SAMPLE AVAILA	BLE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDL		SAMPLE
——————————————————————————————————————	ING TIMZAKUS	
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazard	OUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	_
☐ Acidic	BIOLOGICAL	SHOCK SENSITIVE
CAUSTIC	<u>-</u>	CARCINOGENIC - SUSPECT
OTHER	PEROXIDE	RADIOACTIVE
SAMPLE ALLOCATION / CHAIN OF POSSES	SSION:	
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RECEIVED BY	}	_ DATE RECEIVED 6 20 84
	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
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	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
VECELAED BA		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



\mathcal{T}_{t}	11.00 450	FIELD SAMPLE No. 1580 -0
OOM AND CAME LED! ADDRESS	IKER AFB	
SAMPLE POINT DESCRIPTION	o Creek	
STREAM CHARACTERISTICS: TEMPERATURE	FLOW N/A	PH MA
TOTAL OBSERVATIONS CONFIENTS ACA C	VALIDIA STICOME	
COLLECTOR'S NAME COLLECTED L	DATE/TIME	SAMPLED 6/19/84 1120
	-10°C 0THER	was trim whiteste sample
CAUTION - No MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLIN		
HAZARDOUS SAMPLE (SEE BELOW)	₹ Non-hazari	DOUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
		[] WALLACT TVE
Sample Allocation / Superior Design		
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAMERAS	LON:	
RECEIVED BY AMERICANUS	,	_ DATE RECEIVED 6-20-84
LAB SAMPLE NO. 3405166-03	COMMENTS _	
INCLUSIVE DATES OF POSSESSION		
Organization Name		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS _	<u>`</u>
INCLUSIVE DATES OF POSSESSION		
RECEIVED BY		DATE RECEIVED
Inclusive Dates of Possession		

RADIAN

CHAIN OF CUSTODY RECORD

		FIELD SAMPLE No. 1500-04
COMPANY SAMPLED/ADDRESS TINKE	r AFB	
SAMPLE POINT DESCRIPTION CRUT	CHO CREEK	
STREAM CHARACTERISTICS: TEMPERATURE	FLOW NA REAM CHANNEL	ROUGHLY VEE SHAPED.
COLLECTOR'S NAME GANCAR2 AMOUNT OF SAMPLE COLLECTED 1	DATE/TIM	E SAMPLED 6/19/84 1140
SAMPLE DESCRIPTION COMPOSITE	FROM WATER'S E	DGE. SO' UPSTREAM TOWER
STORE AT: AMBIENT 5°C CAUTION - NO MORE SAMPLE AVAILAB OTHER INSTRUCTIONS - SPECIAL HANDLI	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazaf	RDOUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC -	BIOLOGICAL	
CAUSTIC	PEROXIDE	CARCINOGENIC - SUSPECT
OTHER		RADIOACTIVE
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME RAS RECEIVED BY AUGUSTUS LAB SAMPLE NO 8400166004	COMMENTS	Date received 6 20 84
INCLUSIVE DATES OF POSSESSION		
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CCEIVED BY		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS _	
NCLUSIVE DATES OF POSSESSION		
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VECETAED BA		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS _	
NCLUSIVE DATES OF POSSESSION		

RD.

		FIELD SAMPLE No. 7520-06
COMPANY SAMPLED/ADDRESS TINKE	R AFB	
SAMPLE POINT DESCRIPTION TRIBU	TARY TO ELM CRE	EK. DRY CREEKBED
STREAM CHARACTERISTICS:	,	
TEMPERATURE	FLOW NA	4/4
VISUAL OBSERVATIONS/COMMENTS CRE	EK BOX TRV.	PH
OF THE OWNER OF THE REAL PROPERTY OF THE PER	STATE OF THE STATE	
COLLECTOR'S NAME GANCARY	DATE/TIME S	AMPLED 6/19/84 1300
AMOUNT OF SAMPLE COLLECTED		The state of the s
SAMPLE DESCRIPTION COMPOSITE	of 1 12" PWG.	
STORE AT: AMBIENT 75°C	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS F	RETURN HAUSER ROBITION OF CAMPIE
		THE TORN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLI	NG - HAZARDS	
HAZARDOUS SAMPLE (SEE BELOW)	ST No	
	Non-HAZARDOL	JS SAMPLE
Tox1c	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
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LAB SAMPLE NO. 3406166606	COMMENTS	DATE RECEIVED 4 VV
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
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	. 400	FIELD SAMPLE No. 1500
	R AFB	
SAMPLE POINT DESCRIPTION CAUTE	is creek	
STREAM CHARACTERISTICS:		
	FLOW NA	PH _ <i>N/A</i>
TEMPERATURE NA A VISUAL OBSERVATIONS/COMMENTS	an frash in creek.	78
	<u>'</u>	
COLLECTOR'S NAME STUCKET	DATE/TIME SA	AMPLED 6/19/87 /8/1
AMOUNT OF SAMPLE COLLECTED		
SAMPLE DESCRIPTION Schimen		
STORE AT: AMBIENT T 5°C	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
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OTHER INSTRUCTIONS - SPECIAL HANDLI	NG - HAZARDS	
HAZARDOUS SAMPLE (SEE BELOW)	∞ No.,	
	Non-Hazardou	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	Lachrymator	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		MADIOACTIVE
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ORGANIZATION NAME K/	ine rendres	. 1.21.44
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	COMMENTS	
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AR SAMPLE NO	C	DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		****
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



_		FIELD SAMPLE No. TSED -08
COMPANY SAMPLED/ADDRESS TINKEN	AFB	
SAMPLE POINT DESCRIPTION Cortelo	rock	
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STREAM CHARACTERISTICS:	1.	.1
TEMPERATURE	FLOW MA Youth Center foot	PH _ <i>V/A</i>
VISUAL OBSERVATIONS/COMMENTS New	Ynoth Celder too	bridge
COLLECTOR'S NAME Saucara	DATE/TIME SA	MPLED 6/19/84 /830
AMOUNT OF SAMPLE COLLECTED		
SAMPLE DESCRIPTION Sediment	1 1000	
STORE AT: AMBIENT 5°C] -10°C	
CAUTION - No MORE SAMPLE AVAILABLE	RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLING		
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_ -	_ <i>T</i>	o sarree
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
Caustic .	PEROXIDE	RADIOACTIVE
	<u> </u>	MADIOACTIVE
Sample Allocation / Chain of Possession	1 :	
ORGANIZATION NAME KAS		
RECEIVED BY 4406190-02	A	DATE RECEIVED 6-21-84
LAB SAMPLE NO	COMMENTS	
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INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
VECETAED BA		DATE RECEIVED
LAB SAMPLE No.	Comments	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
AB SAMPLE No.	COMMENTS	
NCLUSIVE DATES OF POSSESSION		



	•	FIELD SAMPLE No. 1360 -0
COMPANY SAMPLED/ADDRESS	er AFB	
SAMPLE POINT DESCRIPTION Khulm		
Stream CharacterisTics:		
TEMPERATURE NA	5. ou 11/4	
VISUAL OBSERVATIONS/COMMENTS	FLOW NA	PH NA
	THE POPULATION OF THE	JG - 4001.
COLLECTOR'S NAME Gancarz	DATE/TIME SAM	APLED 6/19/84 1845
AMOUNT OF SAMPLE COLLECTED	DATE/TIME SAM	APLED WITH 18 TO
SAMPLE DESCRIPTION Sediment		
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLIN		
	IG - NAZARUS	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardous	SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC		SHOCK SENSITIVE
☐ Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	
OTHER	LEROXIDE	RADIOACTIVE
SAMPLE ALLOCATION / CHAIN OF POSSESS	ION:	
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RECEIVED BY		DATE RECEIVED 6-21-84
LAB SAMPLE NO	COMMENTS	
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KECEIVED BY		DATE RECEIVED
LAB SAMPLE No		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE NO	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



		FIELD SAMPLE NO
COMPANY SAMPLED/ADDRESS TINK	er AFB	
SAMPLE POINT DESCRIPTION KHUL		
STREAM CHARACTERISTICS:		
TEMPERATURE	FLOW NA	su NA
VISUAL OBSERVATIONS/COMMENTS CH	FLOW N/A BERBED TO BEORDE	E. ODDR OF THE FUEL
		3-0K 01 321 . CC
COLLECTOR'S NAME GANCARZ	DATE/TIME S	SAMPLED 6/13/84 1930
AMOUNT OF SAMPLE COLLECTED,		1 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
SAMPLE DESCRIPTION Sectiment		
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLIN		-
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazardo	US SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	'
CAUSTIC	PEROXIDE	CARCINOGENIC - SUSPECT
	LENOXIDE	RADIOACTIVE
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INCLUSIVE DATES OF POSSESSION		



		FIELD SAMPLE No. 1507/
COMPANY SAMPLED/ADDRESS TINKE	R AFB	
SAMPLE POINT DESCRIPTION Sold	er Creek	
STREAM CHARACTERISTICS:	- 4//4	4/4
TEMPERATURE	FLOW NAT WARRING	WIEN PH M/A
VISUAL OBSERVATIONS/COMMENTS	straum of V-notch	Wier
COLLECTOR'S NAME Gauss &		Chile I was
	DATE/TIME SA	MPLED 6/20/8 + 10:00
AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION BLACK SC		
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLII		•
	10 - IMZARDS	
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazardou	e cambi e
	(E) NON-HAZARDOO	3 SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
Samuel A. C. D.		
SAMPLE ALLOCATION / CHAIN OF POSSESS	ION:	
ORGANIZATION NAME	1/2/10	1.2144
RECEIVED BY		DATE RECEIVED 67187
LAS SAMPLE NO	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
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LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		Discourse
RECEIVED BY		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		



		FIELD SAMPLE No. 1580-12
COMPANY SAMPLED/ADDRESS LURE	· AFB	
SAMPLE POINT DESCRIPTION	iei Creek	
STREAM CHARACTERISTICS:		
TEMPERATURE	FLOW NA	-u <i>all</i> A-
VISUAL OBSERVATIONS/COMMENTS COMMENTS	well bottom Tust	usstream of B-C-Wei
	180 Harris Civil	15 C-De
COLLECTOR'S NAME JANGEYZ	DATE/TIME	SAMPLED GROBE + 1030
AMOUNT OF SAMPLE COLLECTED	I	SAMPLED WYS TO TO
SAMPLE DESCRIPTION Red Sed	inent	
STORE AT: AMBIENT 5°C		
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE		
THE INSTRUCTIONS - SPECIAL HANDLE	NG - MAZAKUS	
HAZARDOUS SAMPLE (SEE BELOW)	Non-HAZARDO	OUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	_
OTHER	EROXIDE	RADIOACTIVE
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ORGANIZATION NAME RAS	11.	
RECEIVED BY		DATE RECEIVED 6-21-84
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INCLUSIVE DATES OF POSSESSION		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
WECELAED BA		_ DATE RECEIVED
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ORGANIZATION NAME		
WECELAED BA		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



		FIELD SAMPLE No. 1300.13
COMPANY SAMPLED/ADDRESS LUKER	AFB	
SAMPLE POINT DESCRIPTION	1	
STREAM CHARACTERISTICS:		
TEMPERATURE NA	FLOW	11 Mar
VISUAL OBSERVATIONS/COMMENTS 50	In matreus of r	whert
	THURST ST. CY	EDIOT G
COLLECTOR'S NAME GALLARY	DATE/TIME SA	MPLED 6/20/8+ 1/00
AMOUNT OF SAMPLE COLLECTED	DATE TIME SA	MPLED 7
SAMPLE DESCRIPTION Section	J.	
	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLIN		
HAZARDOUS SAMPLE (SEE BELOW)	Non-HAZARDOU	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC .	PEROXIDE	RADIOACTIVE
OTHER		
Sample Allocation / Chain of Possess	ION:	
ORGANIZATION NAMERAS		
RECEIVED BY	vy	DATE RECEIVED 6-21-84
Lab Sample No. <u>8406190-07</u>	COMMENTS	,
Inclusive Dates of Possession		
ORGANIZATION NAME		NATE DECEIVED
LAB SAMPLE No.	COMMENTS	DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



	4-10	FIELD SAMPLE No. 1505/7
COMPANY SAMPLED/ADDRESS LURET	AFB	
SAMPLE POINT DESCRIPTION CONTINE		eek
STREAM CHARACTERISTICS:		
TEMPERATURE	FLOW NA	-11 M/A
VISUAL OBSERVATIONS/COMMENTS	Treew of STP	PH
VISUAL UBSERVATIONS/ COPPENTS 1775	11 June 19 311	
Courses to News (SAUCA)		cla lad 112n
COLLECTOR'S NAME (SUCO 3	DATE/TIME S	SAMPLED 6/20/84 //30
AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION Red Silver	Sedinent	
STORE AT: AMBIENT 5°C O	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILABLE	RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLING	- HAZADDS	_
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Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
Caustic	PEROXIDE	RADIOACTIVE
OTHER		· _
SAMPLE ALLOCATION / CHAIN OF POSSESSI	Ou .	
ORGANIZATION NAME	<u>UN</u> :	
RECEIVED BY	MANIA	DATE RECEIVED 6-21-84
LAB SAMPLE No. <u>8406190-08</u>		_ DATE RECEIVED
	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



	_	FIELD SAMPLE No. 1500 - 15
COMPANY SAMPLED/ADDRESS	r AFB	
SAMPLE POINT DESCRIPTION Sol	dier Creek	
STREAM CHARACTERISTICS:	- 4/4	./a
TEMPERATURE	FLOY NA	PH N/A
VISUAL OBSERVATIONS/COMMENTS	Januar namow (hourel.
Garage Constant		1/6/
COLLECTOR'S NAME SULCA 3	DATE/TIME SA	AMPLED 6/20/84 (200
AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION Sedimon	0.1	
ت کے	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILAB	BLE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE	•	•
	NO TIAZARDO	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardou	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		MADIOACTIVE
SAMPLE ALLOCATION / CHAIN OF POSSES	SION:	
ORGANIZATION NAME COLOR TO THE TOTAL	110	1 21 21
RECEIVED BY CAMPINA X		DATE RECEIVED 6-918
LAB SAMPLE No	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	



	_	FIELD SAMPLE No. 1SED-16
COMPANY SAMPLED/ADDRESS	u AFB	
SAMPLE POINT DESCRIPTION Sold	or Creek	
STREAM CHARACTERISTICS:		
TEMPERATURE	FLOW NA	-u Ala
VISUAL OBSERVATIONS/COMMENTS BOL	Oder streum creek	PH
COLLECTOR'S NAME STUCKES	DATE/TIME SA	MPLED 6/20/84 1240
AMOUNT OF SAMPLE COLLECTED	1	THE TOTAL TO
SAMPLE DESCRIPTION Sediment		
STORE AT: AMBIENT 5°C	-10°C OTHER	
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CAUTION - No MORE SAMPLE AVAILAB		KETURN UNUSED PORTION OF SAMPLE
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HAZARDOUS SAMPLE (SEE BELOW)	Non-hazardou:	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	_
	LICKONIDE	RADIOACTIVE
SAMPLE ALLOCATION / CHAIN OF POSSESS	ION:	
ORGANIZATION NAME RISE	u aundsur	1. 21 411
RECEIVED BY		DATE RECEIVED 6-01-84
	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY	Comerce	DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		
Organization Name		Dama and a second
RECEIVED BY	COMMENTS	DATE RECEIVED
	COMMENTS	
Inclusive Dates of Possession		
	······································	· · · · · · · · · · · · · · · · · · ·



	0	FIELD SAMPLE No. 1500-1
COMPANY SAMPLED/ADDRESS	AFB	
SAMPLE POINT DESCRIPTION	D	
STREAM CHARACTERISTICS:		
TEMPERATURE	FLOW NA	-u 41/4
VISUAL OBSERVATIONS/COMMENTS	FLOW NA	PH
	ary.	
COLLECTOR'S NAME CAUCASZ	DATE/TIME SA	MPLED 6/20/84 /300
AMOUNT OF SAMPLE COLLECTED	2 DATE TIME SA	MIPLED TO TO
SAMPLE DESCRIPTION Sesiment		
	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLING		
	INLANDS	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardou	S SAMPLE
Toxic .	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE .
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER	'i	·
SAMPLE ALLOCATION / CHAIN OF POSSESSI	ON:	
ORGANIZATION NAME RAS	. .	
RECEIVED BY WILL WILL	War.	DATE RECEIVED 10-21 84
LAB SAMPLE NO	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		NATE DECEMBED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE NO		
INCLUSIVE DATES OF POSSESSION		



	471	FIELD SAMPLE No. 1300 18
COMPANY SAMPLED/ADDRESS	W AT B	
SAMPLE POINT DESCRIPTION	tier Creek	
STREAM CHARACTERISTICS: TEMPERATURE VISUAL OBSERVATIONS/COMMENTS	FLOW	PH
COLLECTOR'S NAME	10°C OTHER	
OTHER INSTRUCTIONS - SPECIAL HANDLIN		KETURN UNUSED PORTION OF SAMPLE
HAZARDOUS SAMPLE (SEE BELOW)	₩ Non-Hazardo	US SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR.	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	' '
Caustic .	PEROXIDE	CARCINOGENIC - SUSPECT
Отнея	ENOXIDE	RADIOACTIVE
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME RAS RECEIVED BY SHOW TO LAB SAMPLE NO. 3406 190-11	COMMENTS	DATE RECEIVED 6-21-84
INCLUSIVE DATES OF POSSESSION		
Organization Name		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



	-a A O	FIELD SAMPLE No. 15ED -15
COMPANY SAMPLED/ADDRESS (10 14	ER AFB	
SAMPLE POINT DESCRIPTION CRUTCH	O CRISEK	
STREAM CHARACTERISTICS: TEMPERATURE	FLOWN/A H FOAM DOWNSTREAM	PH <u>N/A</u> OF WEIR
COLLECTOR'S NAME AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION STORE AT: AMBIENT AMBIENT AMBIENT AMBIENT	DATE/TIME SA	MPLED 6/20/84 1630
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE		
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardou	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER	' 	
SAMPLE ALLOCATION / CHAIN OF POSSES: ORGANIZATION NAME RAS RECEIVED BY RECEIVED BY BY CORRES LAB SAMPLE NO. BY CORRES	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



	· ^ CO 3	FIELD SAMPLE No. 13ED 20
COMPANY SAMPLED/ADDRESS TINKE	R ALB	
SAMPLE POINT DESCRIPTION CRUTS	CHO CREEK	
STREAM CHARACTERISTICS:		
	FLOW NA	PH NA
TEMPERATURE	film on surface	
COLLECTOR'S NAME GANCARZ	DATE/IIME S	SAMPLED 6/21/84 0720
AMOUNT OF SAMPLE COLLECTED	1	4-11-1
SAMPLE DESCRIPTION SEDIMEN	T	
STORE AT: AMBIENT X 5°C	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILAB	HE RETURN ALL PORTIONS	T PETURN HAMPER ROOTION OF COURT
		THE TORN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE	ng - Hazards	
		· · · · · · · · · · · · · · · · · · ·
HAZARDOUS SAMPLE (SEE BELOW)	Non-HAZARDO	DUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSES	SION:	
ORGANIZATION NAME		1 22 11
RECEIVED BY		DATE RECEIVED 6-32-34
LAB SAMPLE NO.	COMMENTS	D ICES N
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME	-	
		DATE RECEIVED
LAB SAMPLE NO	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		



		FIELD SAMPLE No. 1>00 0-1
COMPANY SAMPLED/ADDRESS TINK	CR AFB	
SAMPLE POINT DESCRIPTION ORNT		
STREAM CHARACTERISTICS:		
	ELON N/A	44/4
TEMPERATURE W/A VISUAL OBSERVATIONS/COMMENTS NE	AR LANDFILL	PH
COLLECTOR'S NAME GANCARZ	DATE/TIME S	SAMPLED 6/21/84 6800
AMOUNT OF SAMPLE COLLECTED /) DATE/TIME S	SAMPLED GATET BADD
SAMPLE DESCRIPTION SEDIMEN	T	
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILAB	-	
		KETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE	ng - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	A.	· ·
THEATOUS SAFFLE (SEE BELOW)	Non-hazardo	US SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C).
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER	J	
SAMPLE ALLOCATION / Communication		
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME RAS	ION:	
RECEIVED BY	txu	DATE RECEIVED 6-22 34
LAB SAMPLE No. 4406206-0	COMMENTS	_ DATE RECEIVED _U NO U
	\bigcirc	
Inclusive Dates of Possession		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No	COMMENTS	DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	Comments	DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		



		FIELD SAMPLE No. 1500 -1.
COMPANY SAMPLED/ADDRESS TINK	er APB	
SAMPLE POINT DESCRIPTION CRUTE	HD CREEK	
STREAM CHARACTERISTICS:		
,	FLOW _NA	PH
VISUAL OBSERVATIONS/COMMENTS		
77.1		
COLLECTOR'S NAME	Z DATE/TIME S	AMPLED 6/21/84 0900
AMOUNT OF SAMPLE COLLECTED		
SAMPLE DESCRIPTION SEPTIMEN		
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLI		
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazardo	US SAMPLE
Toxic	Skin irritant	FLAMMABLE (FP 40°C)
Pyrophoric	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER	' '	
Sample Allocation / Chain of Possess	Non.	
ORGANIZATION NAMERAS	HUN:	
RECEIVED BY AND THE	Net XLI	DATE RECEIVED 6-22-84
LAB SAMPLE NO. <u>3406206-03</u>	COMMENTS	DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
KECEIVED BY		DATE RECEIVED
LAB SAMPLE No	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



٠	_	FIELD SAMPLE No. 1500 2
COMPANY SAMPLED/ADDRESS	LER AFB	
SAMPLE POINT DESCRIPTION	UTCHO CREEK	
STREAM CHARACTERISTICS:		
TEMPERATURE	5 11/4	
VISUAL OBSERVATIONS/COMMENTS	FLOW NA	PH
VISUAL UBSERVATIONS/ COMPENTS	DIL DI PRENCO	
COLLECTOR'S NAME GANCARZ	Dan /Taux C.	MPLED 6/21/8+ 1000
AMOUNT OF SAMPLE COLLECTED	A	MPLED 4218 F 7000
SAMPLE DESCRIPTION SEDIMER		
STORE AT: AMBIENT TO	☐ -10°C ☐ OTHER	
<u> </u>		
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLI	ng - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardous	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC ·	PEROXIDE	RADIOACTIVE
OTHER	· _	<u> </u>
Sample Allocation / Survey B		
SAMPLE ALLOCATION / CHAIN OF POSSES: ORGANIZATION NAME	SION:	
RECEIVED BY AW TUNA	V	1.27.44
LAB SAMPLE No.		DATE RECEIVED 6-72-84
LAB SAMPLE NO.	COMMENTS	(Procen
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	Comments	·
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		



4		FIELD SAMPLE No. 1>ED-Z
COMPANY SAMPLED/ADDRESS TINKE	R APB	
SAMPLE POINT DESCRIPTION CRUTA	HO CREEK	
STREAM CHARACTERISTICS:		1
TEMPERATURE MA		PH
VISUAL OBSERVATIONS/COMMENTS	SINANCE DETO!	•
CANCOR	2	1/01/01 4/20
COLLECTOR'S NAME SANCAR	DATE/TIME SA	IMPLED 6/21/84 1130
AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION SCDIMEN		
STORE AT: AMBIENT 5°C	10 C OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLING	G - HAZARDS	
	J. HARAINSO	
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazardou	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
☐ ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	_
	LEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSESSI	ON:	
ORGANIZATION NAME RAS	1	
RECEIVED BY	wy	DATE RECEIVED 6-12-54
LAB SAMPLE No. <u>\$406206-04</u>	COMMENTS	
Tues and D. C.		
Inclusive Dates of Possession		
Organization Name		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	Comments	
INCLUSIVE DATES OF POSSESSION		



		FIELD SAMPLE No. TSED
COMPANY SAMPLED/ADDRESS	KER AFB	
Sample Point Description	rcho creek	
Stream Characteristigs:	4	
TEMPERATURE M/A	FLOWNA	PH <u>NA</u>
VISUAL OBSERVATIONS/COMMENTS HA		
COLLECTOR'S NAME GANCARZ	DATE/TIME	SAMPLED 6/21/84 /220
AMOUNT OF SAMPLE COLLECTED	1	CAPITALES TO STATE OF THE STATE
SAMPLE DESCRIPTION SEDIME	NT	
STORE AT: AMBIENT 5°C	-10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILAB	LE PETUBNIALL BORTIONS	Deriver and a second
		RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLI	ng - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	X Non-hazari	DOUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
⊒ □ Acidic	BIOLOGICAL	·
CAUSTIC	<u> </u>	CARCINOGENIC - SUSPECT
_ chostic	PEROXIDE	RADIOACTIVE
¬ 0		
OTHER		
	SION:	
AMPLE ALLOCATION / CHAIN OF POSSESS	SION:	
AMPLE ALLOCATION / CHAIN OF POSSESS REGANIZATION NAME RAS ECCLIVED BY	Yh	DATE RECEIVED 6 13 34
AMPLE ALLOCATION / CHAIN OF POSSESS RGANIZATION NAME RAS ECELVED BY	Yh	DATE RECEIVED 6-13-54
AMPLE ALLOCATION / CHAIN OF POSSESS RGANIZATION NAME	COMMENTS _	
AMPLE ALLOCATION / CHAIN OF POSSESS RGANIZATION NAME RAS ECEIVED BY TANK TO THE POSSESS OF POSSESSION	COMMENTS	
AMPLE ALLOCATION / CHAIN OF POSSESS RGANIZATION NAME	COMMENTS _	
AMPLE ALLOCATION / CHAIN OF POSSESS REGANIZATION NAME RAS RECEIVED BY TANK TO THE POSSESS RECEIVED BY TO THE POSSESSION	COMMENTS _	DATE RECEIVED
AMPLE ALLOCATION / CHAIN OF POSSESS RGANIZATION NAME RAS ECEIVED BY SUPPLY OF THE POSSESSION SUP	COMMENTS _	DATE RECEIVED
AMPLE ALLOCATION / CHAIN OF POSSESS RGANIZATION NAME RAS ECEIVED BY TAWAY AB SAMPLE NO. BY POSSESSION RGANIZATION NAME ECEIVED BY RAB SAMPLE NO. ROLLUSIVE DATES OF POSSESSION ROLLUSIVE R	COMMENTS _	DATE RECEIVED
RECEIVED BY	COMMENTS _	DATE RECEIVED
AB SAMPLE NO	COMMENTS _	DATE RECEIVED



		FIELD SAMPLE No
COMPANY SAMPLED/ADDRESS	KER AFB	
SAMPLE POINT DESCRIPTION CRUTC		
STREAM CHARACTERISTIES:	,	
	5 ul A	
TEMPERATURE ALA	FLOW NA	PH
VISUAL UBSERVATIONS/ COMMENTS	H COUNTE	
COLLECTOR'S NAME SANCARE		1/2/21 /200
AMOUNT OF SAMPLE COLLECTED	DATE/TIME SA	MPLED 4187 1300
SAMPLE DESCRIPTION SOLVED	inT	
STORE AT: AMBIENT 5°C		
— —	–	
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE	ng - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	Non-HAZARDOU	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
	· choxibe	MADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSESS	SION:	
ORGANIZATION NAME	tori	
RECEIVED BY		DATE RECEIVED 62284
LAB SAMPLE NO. <u>\$406206-06</u>	COMMENTS	
Indiana Program Description		
INCLUSIVE DATES OF POSSESSION		
Organization Name		
RECEIVED BY		
LAB SAMPLE No	COMMENTS	
Inclusive Dates of Possession		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		



	_	FIELD SAMPLE No. 1 > 0 0
COMPANY SAMPLED/ADDRESS	ER AFB	•
SAMPLE POINT DESCRIPTION KHU	LMAN CREEK	
STREAM CHARACTERISTICS:	1	,
TEMPERATURE VIA VISUAL OBSERVATIONS/COMMENTS	FLOW NIN	PH <u>MA</u>
VISUAL UBSERVATIONS/COMMENTS	FILM, MUSKER	
1000	3	11 10 1 100
COLLECTOR'S NAME	DATE/TIME SA	AMPLED 6/21/84 /330
AMOUNT OF SAMPLE COLLECTED		
SAMPLE DESCRIPTION SEDIME		
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
		1
OTHER INSTRUCTIONS - SPECIAL HANDLE	NG - HAZARDS	
HAZARDOUS SAMPLE (SEE BELOW)	A N	
- INDIVIDUO SALIFEE (SEE BELOW)	Non-Hazardou	JS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER	' 	
SAMPLE ALLOCATION / CHAIN OF POSSESS	ION:	
ORGANIZATION NAME KHS	Ma	1 22 cil
RECEIVED BY	17/	DATE RECEIVED 67287
LAB SAMPLE No	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No	COMMENTS	DOLL RECEIVED
INCLUSIVE DATES OF POSSESSION		



	50 AFD	FIELD SAMPLE No. 7580 28
COMPANY SAMPLED/ADDRESS TIN	ker hed	
SAMPLE POINT DESCRIPTION AREA	<u> </u>	
STREAM CHARACTERISTICS:		
TEMPERATURE NA	FLOW/A	PH N/A
VISUAL OBSERVATIONS/COMMENTS DR	Y, HARD SUIL. 10	FRUM CULVERT APROX
COLLECTOR'S NAME GANCARE	DATE/TIME SAI	MPIED 6/21/84 1400
AMOUNT OF SAMPLE COLLECTED		
SAMPLE DESCRIPTION SEDIMEN	JT	
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLIN	ng - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardous	SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
Caustic ·	PEROXIDE	RADIOACTIVE
OTHER		-
SAMPLE ALLOCATION / CHAIN OF POSSESS	SION:	
ORGANIZATION NAME KAS		
RECEIVED BY	Way	DATE RECEIVED 6 22-84
LAB SAMPLE No.	COMMENTS	MAREN
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		



		Field Sample No. 7F, 6D, 6G
Company Sampled / Address TINK	ER AFB OKLAHOUA	
Company Sampled / Address TINK Sample Point Description MONITOR	WEUS 7F,60,66	
Stream Characteristics:	3	
Temperature	Flow W/A	-u M
Visual Observations/Comments		рн _//~
Collector's Name AlAMIN STEE	A/	
Collector's Name NANCY STEI Amount of Sample Collected	Date/Time Samp	oled 1/16/84, 7/17/84
Sample Description WELL WATE		
Store at: Ambient 5°C -		
	•	
Caution - No more sample available	Return unused portion of same	ole Discard unused portions
(Other Instructions - Special Handling	Hazarda AINAIE	portions
	Hazards _////NC	
[] Hazardoue compte (see helew)	1	
☐ Hazardous sample (see below)	Non-haz	ardous sample
□ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	Lachrymator ■ Lac	☐ Shock sensitive
∐ Acidic	☐ Biological	☐ Carcinogenic - suspect
□ Caustic	☐ Peroxide	□ Radioactive
Other		
Sample Allocation/Chain of Possession		
Organization NameRAS	on:	
Received By	TMI	1-18-84 Time 11.00
Fransported By	Date Hecelye	d 7-16-84 Time 11.00
Comments	$\left(\begin{array}{c} & \\ & \end{array} \right)$ Lab Sample No. $\underline{\mathcal{G}}$	01010
nclusive Dates of Possession		
Proprietion Name		
Signification Hame		
Received By		
Received By	Date Received	1 Time
Received By	Date Received	
Received By ransported By Comments	Date Received	
Received By Fransported By Comments Inclusive Dates of Possession	Date Received	
Received By Fransported By Comments Inclusive Dates of Possession Organization Name	Date Received	
Received By Fransported By Comments Inclusive Dates of Possession Drganization Name Received By	Date Received Lab Sample No Date Received	Time
Received By Fransported By Comments Inclusive Dates of Possession Organization Name	Date Received Lab Sample No Date Received Date Received	I Time



		Field Sample No. 6A, B, C, 7F,
Company Sampled / Address 11NK Sample Point Description WELL	LER AFB WATER	
Stream Characteristics: Temperature	Flow	-11 1/14
/isual Observations/Comments	DUE FIOW	pH_ <i>_NfA</i>
Collector's Name NANCY STE	Date/Time Sampled	7/17/84-7/18/87
Amount of Sample Collected <u>え VD</u> / Sample Description <u>ど介み 601</u>	1/5178	
_	10°C	
Caution - No more sample available	☐ Return unused portion of sample	☐ Discard unused portions
Other Instructions - Special Handling -		— Disoara dilasea portions
□ Hazardous sample (see below)	(Malan hannel	
	Non-hazard	•
Pyrophoric	☐ Skin irritant ☐ Lachrymator	☐ Flammable (FP< 40°C)
Acidic	☐ Biological	☐ Shock sensitive
Caustic	□ Peroxide	☐ Carcinogenic - suspect☐ Radioactive
Other	- recorde	□ nadioactive
Sample Allocation/Chain of Possessio	n:	
organization Name RAS -		
leceived By	Date Received	7-20-94 Time 10-00
ransported By	Lab Sample No. 340	
comments	7 F mot received	
nclusive Dates of Possession		
rganization Name		
eceived By	Date Received	Time
ransported Bŷ	Lab Sample No.	11110
omments		
clusive Dates of Possession		
rganization Name		
eceived By	Date Received	Time
ansported By	Lab Sample No.	
omments		
clusive Dates of Possession		



_		Field Sample No. TSED - 20
Company Sampled Address TINK	or AFB	
Sample Point Description CRUTCH	CREEK	
Stream Characteristics: Temperature	Flow MA	рн <i>N/Л</i>
Collector's Name ANCAR2 Amount of Sample Collected LL Sample Description Store at: Ambient P5°C -	Date/Time Sample	
☐ Caution - No more sample available Other Instructions - Special Handling -	☐ Return unused portion of sample	_
☐ Hazardous sample (see below)	∭ Non-hazare	dous sample
□ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
∐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	□ Peroxide	□ Radioactive
□ Other		- nadioactive
Sample Allocation/Chain of Possession Organization Name	n:	
Received By	Date Received_	7-20-84 Time 10:00
Transported By 1714 94	Lab Sample No 	7113-01
Comments		
nclusive Dates of Possession		
Organization Name		
Received By	Date Received	Time
папаропед ву	Lab Sample No.	
Jomments		
nclusive Dates of Possession		
Organization Name		
received By	Date Received	Time
ransported by	Lab Sample No.	
Omments		
nclusive Dates of Possession		



		Field Sample No. TSED -23
Company Sampled / Address Tink	OR AFB	
Sample Point Description <u>CRUTCH</u>	COER	
·	ACOIC	
Stream Characteristics:		1.
Temperature WA	Flow N/4	pH _ <i>\bigvert A</i>
Visual Observations/Comments 181		
Collector's Name D GANCARZ	Data/Time Samples	1 1/9/4/
Amount of Sample Collected	Date/ time Sampled	4:21:7
Sample Description SEDINENT		
Store at: ☐ Ambient ☐ 6°C ☐ -		
•		
☐ Caution - No more sample available	☐ Return unused portion of sample	Discard unused portions
Other Instructions - Special Handling -		
☐ Hazardous sample (see below)	Ĵ © Non-hazard	loue comple
☐ Toxic	7	
	□ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
Li Acidic	☐ Biological	☐ Carcinogenic · suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
Other		
Sample Allocation/Chain of Possessio	n:	
Organization Name <u>RAS</u>		
Received By	Date Received _	1-20-84 Time 10:00
Transported By 910 9.	Lab Sample No. 940	
Comments		
Inclusive Dates of Possession		
Organization Name		
Received By		Time
Transported By	Lab Sample No.	(IIIIe
Comments		
Inclusive Dates of Possession		
Organization Name		
Received By	Date Received	Time
Transported By	Lab Sample No	11116
Comments		
nclusive Dates of Possession		



_		Field Sample No. ISED 28
Company Sampled / Address	ER AFB	
Sample Point Description ARCA	D	
Stream Characteristics:		
Temperature	51am 4/4	
Visual Observations/Comments	NE LION THE	pH _ <i>N/R</i>
Collector's Name GANCARZ Amount of Sample Collected 11	Data/Time Sam	-lod -7/19/84
Amount of Sample Collected 1.	Date/ Iline Sam	
Sample Description SEDIMENT		
Store at: Ambient 5°C -	10°C	
•		
☐ Caution - No more sample available	☐ Heturn unused portion of sam	ple Discard unused portions
Other Instructions - Special Handling	Hazards	
☐ Hazardous sample (see below)	- PNon-haz	zardous sample
☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
∐ Acidic	☐ Biological	☐ Carcinogenic · suspect
☐ Caustic	☐ Peroxide	□ Radioactive
□ Other		
Sample Allocation/Chain of Possessio	n:	
Organization Name		
Received By		d 1-20-84 Time 10.00
Transported By	Lab Sample No	407113-03
Comments		
Inclusive Dates of Possession		
Organization Name		
Received By	Date Receive	d Time
галаропес ву	Lab Sample No.	
Comments		
Inclusive Dates of Possession		
Organization Name		
Received By	Date Received	d Time
Transported by	Lab Sample No.	
COMMISSING		
Inclusive Dates of Possession		



OC, GD, GE, GF, GG, FIELD SAMPLE No. 7A, 7C, 7F, 2A

COMPANY SAMPLED/ADDRESS TINKER	AFB, OK	, -,
SAMPLE POINT DESCRIPTION MOUNTOR		
STREAM CHARACTERISTICS:		
TEMPERATURE NA	FLOW NA	on N/A
VISUAL OBSERVATIONS/COMMENTS _A/DA/	E	
COLLECTOR'S NAME NAMEY STEI	N/DAG DATE/TIME	SAMPLED 7/30/84 - 7/3/84
AMOUNT OF SAMPLE COLLECTED 2 VO	9' each site	THE THE PARTY OF T
SAMPLE DESCRIPTION Well water		
STORE AT: AMBIENT \$5°C	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE		RETURN UNUSED PORTION OF SAMPLE
COTHER INSTRUCTIONS - SPECIAL HANDLII		
HAZARDOUS SAMPLE (SEE BELOW)		
TINZARDOUS SAMPLE (SEE BELOW)	Non-hazard	DUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
Sample Allocation / Chain of Possess	ION:	
ORGANIZATION NAME RAS		
RECEIVED BY	Us	DATE RECEIVED 8-1-84
LAB SAMPLE NO	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		



6A,6B,6D,6G

		Field Sample No7G
Company Sampled / Address USA	ł F	
Sample Point Description TINK	ER AFB, OK	
Stream Characteristics: Temperature	Flow NA	nu 4/4
Visual Observations/Comments	INE	pri
Collector's Name NANCY 54	EIN BOARTING O.	
Amount of Sample Collected 2 VOA	EACH SITE	ed A// b +
A 1 - A 1 - 14		
Store at: Ambient 5°C -	10°C □ Other	
₩		
Caution - No more sample available	☐ Return unused portion of samp	e Discard unused portions
Other instructions - Special Handling -	Hazards /VUNE	
☐ Hazardous sample (see below)	An har	rdous sample
☐ Toxic	/	
☐ Pyrophoric	☐ Skin irritant	☐ Flammable (FP< 40°C
□ Acidic	☐ Lachrymator	☐ Shock sensitive
□ Caustic	☐ Biological ☐ Peroxide	☐ Carcinogenic · suspect
□ Other	- Leiovide	□ Radioactive
Sample Allocation/Chain of Possessio	n·	
Organization NameQAS	•••	
Received By	Date Received	5254 Time 11:15
Transported By Uald W	Lab Sample NoSt	HOSDAO
Comments		
nclusive Dates of Possession		
Organization Name		
Received By	Data Passived	Time
ransported By	Lab Sample No.	IIMe
Comments		
nclusive Dates of Possession		
Organization Name		
leceived By	Date Received	Time
ransported By	Lab Sample No.	
nclusive Dates of Possession		



		FIELD SAMPLE No. 6E, 6F, 7C, 7A, 7C
COMPANY SAMPLED/ADDRESS US A	F	FIELD SAMPLE NO. 95,001, 10, 1A, 1
SAMPLE POINT DESCRIPTION TINK	ER AFB OK	LA HOUA
	1	
STREAM CHARACTERISTICS:	E	
TEMPERATURE	VE PLOW	PH
COLLECTOR'S NAME GANCAR 2	DATE/TIM	E SAMPLED 8/14/84 - 8/15/84
AMOUNT OF SAMPLE COLLECTED 2 10	A VIAL EALH SI	TE
SAMPLE DESCRIPTION EPA 60		
	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLI	NG - HAZARDS NONE	
		· ·
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazaf	RDOUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSES	SION:	
ORGANIZATION NAME RAS	- 104	
RECEIVED BY	MAXIA	DATE RECEIVED 8-16-84
LAB SAMPLE NO.	()	
INCLUSIVE DATES OF POSSESSION		
Organization Name		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY	·	DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		



	Field	Sample No. 6A, BC, 7 1
Company Sampled / Address 11NKE Sample Point Description Well 50		
Stream Characteristics: NA NA	VE	pH
Collector's Name <u>NANCY</u> STA Amount of Sample Collected <u>2 VOA</u> Sample Description <u>EPA 624/6</u> Store at: Ambient \$\sqrt{2}5°C - \frac{1}{2}	9 1 liter per sife	1/17/84 — 1/18/84
	☐ Return unused portion of sample ☐ I	Discard unused portions
☐ Hazardous sample (see below)	Non-hazardous	s sample
	☐ Skin irritant	☐ Flammable (FP< 40°C
☐ Pyrophoric	□ Lachrymator	□ Shock sensitive
_ i yrophene _i Acidic	☐ Biological	□ Carcinogenic · suspect
Caustic		□ Radioactive
Other		
Sample Allocation / Chain of Possession Organization Name Received By Transported By Comments	Date Received 7 Lab Sample No. 840: Mple: (A, B, C, + 7	120/84 Time 8:35 7131 G
Organization Name	D. A. D. Calved	Time
Received By	Date Received	111110
Transported By	Lab Sample No.	
Comments		
Organization Name	Date Received	Time
Received By	Lab Sample No	
Transported By	Lab Sample No	
Comments		
Inclusive Dates of Possession		



		Field Sample No. 6ABC7
Company Sampled / Address 11/K	ER AFB amples	· / - /
Sample Point Description Well S	amples	
Stream Characteristics: Temperature	Flow <i>~//</i> {	pH_ <i>_\U\X</i>
Visual Observations/Comments	NE '	
Collector's Name NANCY 57 Amount of Sample Collected 2 VOA Sample Description EPA 624/ Store at: Ambient \$\int_05^{\circ}C -	625	1/17/84 - 7/18/34
Caution - No more sample available	☐ Return unused portion of comple	□ Discord unused newtons
Caution - No more sample available Other Instructions - Special Handling -	Hazarda NOIE	ם טו שכפום unused por tions
	11020100	
∃ Hazardous sample (see below)	Non-hazard	lous sample
] Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
Pyrophoric	☐ Lachrymator	☐ Shock sensitive
J Acidic	☐ Biological	☐ Carcinogenic · suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
] Other		All the second s
sample Allocation/Chain of Possessio	n:	
Organization Name Raduan	Corporation.	
eceived By DLOGOL	. Date Received	1120/84 Time 8:35
ransported By	Lab Sample No. 840	7/3/
comments fled only so	moles: CABC + 5	1-6-
clusive Dates of Possession		
rganization Name		
eceived By	Date Received	Time
ansported By	Date Received Lab Sample No	I IMB
omments	Lab Sample No.	
clusive Dates of Possession		
eceived By	Date Received	Time
ansported By	Lab Sample No	IIMe
omments	540 Cample 110	
clusive Dates of Possession		



		Field Sample No LeD, LEE, LOF
Company Sampled / Address // /	ken AFB	66, 7A, 7C
Sample Point Description We	Il samples	, , , , ,
Stream Characteristics: Temperature	Flow/A	/ 4
Visual Observations/Comments	Flow//#	pH <i>U/A</i>
visual Observations/Comments		
Collector's Name Manay F	Stein Date/Time Sample	1/1/1 20 - 31
Amount of Sample Collected / 2	VOA and I like /	5000 BO SI
Sample Description Well Wa	ter	
Store at: Ambient 55°C -		
Caution - No more sample available	Return unused portion of sample	☐ Discard unused portions
Other Instructions - Special Handling	- Hazards Nove	
☐ Hazardous sample (see below)	Non-hazaro	dous sample
□ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic · suspect
□ Caustic	☐ Peroxide	□ Radioactive
□ Other		
Sample Allegation (Obsider & Barrey)		
Sample Allocation/Chain of Possessio	on:	
Organization Name <u>Fadian ()</u> Received By <u>Federal Copr</u>	- goracon	9/./24
Transported By Fodes of Force	Date Received _	8/1/84 Time <u>9:00 ///</u>
Comments	Lab Sample No. <u>84 -</u>	08-013
Inclusive Dates of Possession		
Organization Name		
Organization Name		
Transported By Fall	Date Received _	Time
Transported By <i>Federal Copy</i>	Date Received Lab Sample No	Time
Comments		
nclusive Dates of Possession		
nclusive Dates of Possession Organization Name		
comments Inclusive Dates of Possession Organization Name Received By	Date Received	Time
nclusive Dates of Possession Organization Name	Date Received Lab Sample No	Time



APPENDIX H

Analytical Data

All samples for chemical analysis were submitted to Radian Analytical Services' laboratory. The samples were logged in, and the data reported out, in "batches". The following pages contain the analytical data reports for the various batches of samples. Table H-1 is a key for assigning the samples to the proper batch. Table H-2 is a cross-reference between zones and corresponding laboratory sample batches.



TABLE H-1. LABORATORY BATCH BREAKOUT KEY

- Lab # 84-06-166, June 20, 1984 Sediment Samples TSED-01, 02, 03, 04, 05, 06
- Lab # 84-06-190, June 21, 1984 Sediment Samples TSED-07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 18
- Lab # 84-06-206, June 22, 1984 Sediment Samples TSED-19, 21, 22, 24, 25, 26, 27
- Lab # 84-07-090, July 18, 1984 6D, 6G, 7F for EPA Method 601
- Lab # 84-07-093, July 18, 1984 6D, 6G, 7F for EPA Method 624/625
- Lab # 84-07-112, July 20, 1984 6A, 6B, 6C, 7G for EPA Method 601
- Lab # 84-07-113, July 20, 1984 Sediment Samples TSED-20, 23, 28
- Lab # 84-07-131, July 23, 1984 6A, 6B, 6C, 7G for EPA Method 624/625
- Lab # 84-08-003, August 1, 1984 2A, 6C, 6D, 6E, 6F, 6G, 7A, 7C, 7F for EPA Method 601
- Lab # 84-08-013, August 1, 1984 6D, 6E, 6F, 6G, 7A, 7C, for EPA Method 624/625
- Lab # 84-08-020, August 2, 1984 6A, 6B, 6D, 6G, 7G for EPA Method 601
- Lab # 84-08-167, August 16, 1984 6E, 6F, 7A, 7C (Sample on 8/14), 7C (Sample on 8/15) for EPA Method 601



TABLE H-2. CROSS REFERENCE

		S REFERENCE
	Sampling Station (Figure 3-4)	Lab # 84-
Sediments - TSED-01	1	06.166
02		06-166
03		06-166 06-166
04		06-166
05	4 (duplicate)	06-166
06		06-166
07	12	06-190
08	13	06-190
09	22	06-190
10	21	06-190
11	17	06-190
12	18	06-190
13	15	06-190
14	16	06-190
15	14	06-190
16	19	06-190
17	discarded*	06-190
18	15 (duplicate)	06-190
19	10	06-206
20	8	07-113
21	9	06-206
22	9 (duplicate)	06-206
23	7	07-113
24	6	06-206
25	5	06-206
26	11	06-206
27	23	06-206
28	24	07-113
Monitor Wells - 2A		08-003
6A	07-1	12, 07-131, 08-020
6B	07-1	12, 07-131, 08-020
6C 6D	07-1	12, 07-131, 08-003
6E	07-0	90, 07-093, 08-003, 08-013, 08-020
6F	00-00	03, 08-013, 08-167
6G	08-0	03, 08-013, 08-167
OG .	07-09	90, 07-093, 08-003, 08-013, 08-020
7A	08-00	03, 08-013, 08-167
7C	08-00	03, 08-013, 08-167
7 F 7G	07-09	90, 07-093, 08-003
/G	07-11	2, 07-131, 08-020

^{*}Incorrect sample site; sample discarded.

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PAGE 1 RECEIVED: 06/20/84

Analytical Serv REPORT 04/26/85 12:15:10

LAB # 84-06-166

Marshir	PERTIFIED BY	CONTACT CONDVER	sults are reported			the detection limit.
PREPARED Radian Analytical Services BY <u>BSO1 MoPac Blvd.</u> P.O. Box 9948	AUStin, Texas 78766 ATTEN	PHONE (512) 454-4797	<u>RCRA Herbicides and RCRA Pesticides results are reported in uq/q.</u>	Duplicate of report of OB/15/84.	Footnotes and Comments	* <u>Indicates a value less than 5 times the detection limit</u> Potential error for such low values ranges between 50 and 100%.
REPORT Radian TO B1. 4 Austin	ATTEN William Little	r Tinker AFB SAMPLES 6		Seulments Goncari Fed Ex	± 212-027-21-05	3795
REPORT TO	ATTEN	CLIENT COMPANY FACILITY	2009	TAKEN TAKEN TRANS	TYPE P. O. #	# 2 H-5

specific matrix was not within acceptable limits indicating an interferent present.

SAMPLE IDENTIFICATION

TSED-01 TSED-02 CSED-03 ISED-04 ISED-05 SED-06

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@ Indicates that spike recovery for this analysis on the

Analytical Serv REPORT RESULTS BY TEST

CORPORATION

PAGE 2 RECEIVED: 06/20/84

default units	Sample 01	Sample 02 (entered units)	Sample 03 (entered units)	Sample Of	Sample 05
4 5 m		~	C	S.	
t ug/m1	6/60	0/00	9/03	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	3
AS_GA					
ug/m1	6/60	5/57	0 / 0 A	0/07	1 03 10 3
-LI		240			
. cg/m]	6/60	គិ / ចិក	6/60	6 / 6n	3/85
u [3		ru.	cu cui	< 063 €
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	ا نر	3	5	5 0	ت
J. 6	5/60	គ/តភ	6/60	6/60	5/68
		n			<u></u>
T#\60 H-	5/6n	6/63	5/50	6/60	5/55
	oco rui	r~ Lerzi	ear Cui	ഘ	i Om
## \fa	9,60	ច់/ចិក	5/50	6/60	B/ ៦ភ
	n	S	<u>-</u>	O. 23	<u>6</u>
J € 27	6/65 V	គឺ/គីភ	6/60	6/60	6/60
	**************************************	190 00 00 00 00 00 00 00 00 00 00 00 00 0	0.051	0.060	0.038
	5 60 CCCC 1	\$ / 6A	គ/គ្	6/60	6/68
		- F		-	630
	5 C	5/5n	គ្រី/គិក	6/60	តិ/ចំ <u>ក</u>
1 6 6 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6 7 6	in the second se	x	ro o⊷	2	<u></u>
		សិ/សិក 	ច/ចំក	6/60	ត្⁄ត <u>ូ</u> ក
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₩		5/55 ()	5/57 5/57	0 / BD	ត្ _/ ចិក
t ug/ml	0/03		ကျ (မော် :	*	<u></u>
FCB SS		5.50 N	5 C	6 / 6 / 6 / M	6767 NID
6/65		3	2	200	

						, ,			
* *	166 JM ABOVE	0.02 4979 6.71 06/22/84	06/27/84	C. 33.	6/65 6/65 6/65				
	LAB # 84-06-166 CONTINUED FROM ABOVE	0.05 6.75 06/22/84	06/27/84	0.48 1.03 1.03	6 6 6 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5				
	REPORT	0.11 7.10 06/22/84	06/27/84	0, 63 0, 63	ត/តភ ស្ត្រី ភ				
	Serv RESULTS BY	0.18 6.90 06/22/84	06/27/84	0.38	5/55 \$\fon 5/55				
	Analytical	\(\cdot \) \(\cdot \) \(\cdo \) \(\cdo \) \(\cdo \) \(\cdo \) \(\cdo \) \(\cdo \) \(09/27/84	0.55°	6/6n	Sample Ob (entered units)	0.49√9	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	5100 5100 5100 5100
CORPOR	PAGE 3 RECEIVED: 06/20/84	PHEN A PH	PRED X date complete	10 m m m m m m m m m m m m m m m m m m m	IN E	TEST CODE default units	AG E 49.7a1	0.55 E E E E E E E E E E E E E E E E E E	CNTOTA mg/L CR E ug/m1

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	06/20/84
# #	
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RPORATION		06/20/84
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NAME RCRA Pesticides Category VERIFIED BY LLN RESULT BET. LIMIT	p	FRACTION OIB Date & Time Co	6/29/84 RESULT C. 002	## M
			₹ 05	Toxaphene
		And the state of t	<.02	Methoxychlor
			<. 002	Endrin
		The second secon	<.002	Lindane
BET.	OTHER PESTICIDES		RESULT	COMPOUND
ВХ		DAT	6/29/84	
rategory	יחוובר רבח חסיונים	בסונ מ - ז אני נ		
		FRACTION OIL		PLE ID ISED-01
. , , , , , , , , , , , , , , , , , , ,	TEST CODE PIRCRA			All results
20 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	THIS REPORT. tion limit. unless otherwise TEST CODE PIRCR	DEFINITIONS specified micrograms/	MOTES A tected at reported	ND = not de
ת מירי ירטט ביריי	THIS REPORT. Lion limit. Unless otherwise	DEFINITIONS specified micrograms/	MOTES A tected at	Silvex) = not
ת מירייים מיריי	THIS REPORT. tion limit. unless otherwise	DEFINITIONS specified micrograms/	C.2 NOTES A tected at	2,4-D 2,4,5-TP (Silvex) ND = not de
RESULT BET. LIMIT	OTHER HERBICIDE FIRE UNIES OTHERWISE	DET. LIMIT DEFINITIONS Specified. micrograms/	RESULT C.2 C.2 C.2 NOTES A tected at	COMPOUND 2,4-D 2,4,5-TP (Silvex) ND = not de
VERIFIED B RESULT DET.	INJECTED 07/23/8 ANALYST DRL OTHER HERBICIDE FION limit. Unless otherwise TEST CODE PIRCR	DET. LIMIT DEFINITIONS specified d micrograms/1	RESULT C.2 C.2 C.2 tected at	
NAME RCRA Herbicides Category VERIFIED BY RESULT DET. LI	TEST CODE HIRCR INJECTED 07/23/8 ANALYST DRL OTHER HERBICIDE FIIS REPORT. Lion limit. Unless otherwise TEST CODE PIRCR		RESULT C.2	779 .

CORPORATION

REPORT

Analytical Serv

LAB # 84-06-166 Continued From Above VERIFIED BY LLN DET. LIMIT VERIFIED BY LLN NAME ACRA Pesticides NAME RCRA Herbicides NAME RCRA Pesticides Category Category Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified. FRACTION OZB TEST CODE HIRCRA Date & Time Collected 06/19/84 FRACTION O2B TEST CODE PIRCRA Date & Time Collected O6/19/84 FRACTION OIB TEST CODE PIRCRA Date & Time Collected 06/19/84 DATE INJECTED 07/23/84 OTHER HERBICIDES OTHER PESTICIDES DATE INJECTED 07/06/84 ANALYST DRL ANALYST BRL NOTES AND DEFINITIONS FOR THIS REPORT. $ND^*=$ not detected at the specified detection limit. ND = not detected at the specified detection limit. Results by Sample DET. LIMIT DET. LIMIT (a) (v) γ γ RESULT RESULT < 005 ≥ C00 > . OS DATE EXTRACTED 07/17/84 DATE EXTRACTED 06/29/84 COMPOUND 2,4-0 CONCENTRATION FACTOR 2, 4, 5-TP (Silvex) COMPOUND Endrin Lindane Methoxychlor PAGE 6 RECEIVED: 06/20/84 SAMPLE ID ISED-02 SAMPLE ID TSED-01 SAMPLE ID TSED-02 H-10

CORPORATION RECEIVED: 06/20/84

REPURT Results by Sample Analytical Serv

LAB # 84-06-166 Continued From Above

SAMPLE 1D TSED-02

FRACTION 02B TEST CODE PIRCRA Date & Time Collected 06/19/84

NAME RCRA Pesticides Category

Toxaphene

. 020 ∴

NOTES AND DEFINITIONS FOR THIS REPORT.

ND=not detected at the specified detection limit. All results reported in micrograms/liter unless otherwise specified.

SAMPLE ID TSED-03

FRACTION 03B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected 06/19/84 Category

VERIFIED BY LLN

H DATE EXTRACTED 07/17/84 CONCENTRATION FACTOR

DATE INJECTED 07/23/84 ANALYST DRL

OTHER HERBICIDES

DET. LIMIT

RESULT

COMPOUND

2,4-0

RESULT

2, 4, 5-TP (Silvex)

C)

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 10 1SED-03

FRACTION O3B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected O6/19/84 Category

DATE EXTRACTED 06/29/84 CONCENTRATION FACTOR

DATE INJECTED 07/06/84

VERIFIED BY LLN

Category

PAGE 8 RECEIVED: 06/20/84

Results by Sample Analytical Serv

Continued From Above LAB # 84-06-166

SAMPLE 1D TSED-03

FRACTION 03B TEST CODE PIRCRA

NAME RCRA Pesticides Category

Date & Time Collected 06/19/84

RESULT

DET. LIMIT

RESULT <. 002 ≥ COMPOUND Lindane

∴ 002

Endrin

<.02

Methoxychlor

OTHER PESTICIDES

DET. LIMIT

Toxaphene

. 020 ∴

NOTES AND DEFINITIONS FOR THIS REPORT.

ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

H - 12

SAMPLE ID 1SED-04

FRACTION 04B TEST CODE HIRCRA NAME RCRA Herbicides

Date & Time Collected 06/19/84

DATE INJECTED 07/23/84 ANALYST DRL

DET. LIMIT

RESULT

COMPOUND

DATE EXTRACTED 07/17/84

CONCENTRATION FACTOR

OTHER HERBICIDES

RESULT

VERIFIED BY LLN

Category

2,4,5-TP (Silvex)

() ()

2,4-₽

o V

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified ND = not detected at the specified detection limit.

CORPORATION

LAB # 84-06-166

REPORT

Analytical Serv

VERIFIED BY LLN DET. LIMIT NAME RCRA Pesticides Category RESULT FRACTION O4B TEST CODE PIRCRA Date & Time Collected 06/19/84 OTHER PESTICIDES DATE INJECTED 07/06/84 ANALYST DRL Results by Sample DET. LIMIT <.02 <.002 RESULT ∴ 002 DATE EXTRACTED 06/29/84 CONCENTRATION FACTOR COMPOUND Lindane Endrin Methoxychlor RECEIVED: 06/20/84 SAMPLE 1D TSED-04

NOTES AND DEFINITIONS FOR THIS REPORT.

<. 02

Toxaphene

H-13

FRACTION OSB TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected O6/19/84 Category ND = not detected at the specified detection limit. All results reported in micrograms/liter unless otherwise specified.

SAMPLE 1D 1SED-05

Category

VERIFIED BY LLN DATE INJECTED 07/23/84 ANALYST DRL OTHER HERBICIDES DET. LIMIT (d 'Y RESULT DATE EXTRACTED 07/17/84 CONCENTRATION FACTOR COMPOUND 2, 4-B 2,4,5-TP (Silvex)

NOTES AND DEFINITIONS FOR THIS REPORT.

	Analutic
CORPORATION	06/20/84
•••	PAGE 10 RECEIVED:

SAMPLE 1D TSED-05

REPORT Results by Sample al Serv

Continued From Above LAB # 84-06-166

NAME RCRA Herbicides FRACTION OSB TEST CODE HIRCRA Date & Time Collected 06/19/84

Category

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

VERIFIED BY LLN BET. LIMIT NAME RCRA Pesticides Category RESULT FRACTION 05B TEST CODE PIRCRA DATE INJECTED 07/06/84 AMALYST DRL OTHER PESTICIDES Date & Time Collected 06/19/84 DET. LIMIT <.02 . 02 ∴ RESULT <. 002 ≥ <. 002 DATE EXTRACTED 06/29/84 COMPOUND CONCENTRATION FACTOR Lindane Endrin Toxaphene Methoxychlor SAMPLE 1D TSED-05 H-14

All results reported in micrograms/liter unless otherwise specified MOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

NAME RCRA Herbicides Category
FRACTION OGB TEST CODE HIRCRA NAME Date & Time Collected O6/19/84
FRACTION 06B Date & Time Co
SAMPLE ID TSED-06

RESULT DATE EXTRACTED 07/17/84 CONCENTRATION FACTOR COMPOUND

OTHER HERBICIDES

DET. LIMIT

DATE INJECTED 07/23/84

ANALYST

DET. LIMIT

VERIFIED BY LLN

RECEIVED: 06/20/84

REPORT Results by Sample Analytical Serv

Continued From Above LAB # 84-06-166

SAMPLE 10 1SED-06

FRACTION 06B TEST CODE HIRCRA Date & Time Collected 06/19/84

NAME RCRA Herbicides Category

2,4-6

ń ال

(V)

2, 4, 5-TP (Silvex)

MOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

SAMPLE 1D TSED-06

FRACTION OGB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected O6/19/84 Category

VERIFIED BY LLN

Category

DATE EXTRACTED 06/29/84 H DATE EXTRACTED CONCENTRATION FACTOR

DATE INJECTED 07/06/84 ANALYST DRL

OTHER PESTICIDES

DET. LIMIT

RESULT

COMPOUND

RESULT

BET. LIMIT

Methoxychlor

Endrin

<.002

<. 602

Lindane

€. 02

Ċ 05

Toxaphene

MOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

EN PORTION

Analytical Serv REPORT 04/26/85 11:49:10

LAB # 84-06-190

PAGE 1 RECEIVED: 06/21/84

PREPARED Radian Analytical Services BY 8501 MoPac Blvd. P. O. Box 9948 Austin, Texas 78766 ATTEN	(512) 454-4797 CONTACT CONDVER	PIRCRA and RIRCRA are reported in ug/q.	Duplicate of report of OB/16/84	Footnotes and Comments	* Indicates a value less than 5 times the detection limit. Potential error for such low values ranges between 50 and 100%.
PREPARED ATTEN	ES 12	PIRCRA	Dup lice		* Indicates Potential e
EPORT <u>Radian</u> TO <u>B1. 4</u> Austin ATTEN William Little	WY Tinker AFB		ID sediments EN Gancarz		# <u>212-027-21-05</u> # <u>3844</u>
REPORT TO ATTEN	CLIENT COMPANY FACILITY		WORK ID TAKEN	TRANS	INC. O.

<u>specific matrix was not within acceptable limits indicating</u> <u>e Indicates that spike recovery for this analysis on the</u> <u>an interferent present.</u>

H-17

Analistical Conv. TECT PRINCE and MANGE SAMPLE IDENTIFICATION TSED-08 TSED-07 FSED-09 SED-10 TSED-12 ISED-13 TSED-14 SED-15 SED-16 SED-18 SED-11

TSED-17

	A Total Phenolics	DH	W Special Digestion Method	X Special Diseation Mathod	Selenium, low level	Total Organic Carbon	Zinc, ICPES										
NAMES USE	PHEN A	PH A	PREP W	PREP	SE GA	TOC	ZN E										
Analytical perv from CUDES and NAMES used on this report	AG E Silver, ICPES	AS GA Arsenic, low level			CMTUTA Total Cyanide			F IC Fluoride, IC		HG CA Mercury, Cold Vapor	;	NI E Mickel, ICPES	NG3 IC Witrate, IC	أسيد	PB GA Lead, low level	PCB SS PCBs in Soil	
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this report

REPO
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Itical Serv
Analyti

置 RESULTS BY TEST

LAB # 84-06-190

04 Sample 05								6/67 6/6/8																
Sample 03 Sample entered of								6 / 5 C																
Sample OZ (entered units) (e	Ö	5/5n		5/5n	7	5/5a	000 mi	25 W	b/6n	ᅋ	គិ/គិភ	edr edr	8 / 6 G		5/5a c	- CER	6/67 080	0/03 01:	n n ===== ' Or~	5/50	√0	5/57		
Sample OI		6/60	O~ ~~i	6/6n		מה מה איים מה איים			គ្ វិធីភ	[<u></u>	5/5n u		6/67 700 700 700 700 700 700 700 700 700 7	'ଧ୍ୟ ଇ	5/50 000 000 000 000 000 000 000 000 000	ברת המש היי ה	5.50	0/07	יינים יינים יינים	6/60	₩ 0	6/60	~~ `u	
TEST CODE	AG_E	ug/m]	AS GA	E Lu.			40/m1	CNTOTA	mg / L	ا اعد اعد	[₩/65]	u e	T## / To La	بر ا ا	7 V			ug/m1	W	ug/ml		30 75 E		i w / w]

PAGE 3 RECEIVED: 06/21/84	Anali	Analytical Serv RESULTS BY	REPORT	LAB # 84-06-190 CONTINUED FROM ABOVE	5-190 FROM ABOVE	
PHEN A	0, 13 ug/g 7, 19	0.10	0.08	0.11	0.04	
	06/25/84	06/25/84	06/25/84	06/25/84	06/25/84	
date complete	06/27/84	06/27/84	18/27/90	06/27/84	06/27/84	
SE_GA	0.93	0	50	0 0	0.38	
	0, 41	0.59	0.54 0.54	0 41	5/65 6/65 6/65 6/65 6/65 6/65 6/65 6/65	
سا ت	6/67 000 000	5/57	6/67	6 / 6 n	6/63 6/63	
ug/m1	6/60	5/50	6/67	5/6n	6/6n	
TEST CODE	Sample 06 (entered units)	Sample 07 (entered units)	Sample 08	Sample 09	Sample 10 (entered units)	,
	OJ.	Ç	망	8 0	S	
AS_GA	0,31	6/67	0, 54 0, 54	6/6n 0 3G	5/5n	
ug/ml BA E	410	5/6a	6/60 6/60	6/6n ()EE	6/65 000	
CD_E	6/67 E	6 6 C)	6, 20	6/65 08 08	5/67 73	
CNTOTA :	0.9/g	6,01	6/60	5/50 	5/55 5/55 W	
	130	6/60	5 5 6 7	6/60	300	
	6/60	5/6n	ចិ/ចិក	6/60	5/5n	

	90 M ABOVE	69	6, 63 0, 33	6 do 0		6/6n	55 W	5/65 6/66	5 9 9 9 1 1	O	7, 16	06/25/84	18/21/90	eg G	6,62	6/65 09	5/65
	LAB # 84-06-190 CONTINUED FROM ABOVE	CT.	0,16	5 0	6/67	6/60	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	6/65 330	.00.00 (10.	0.06	6/60	06/25/84	06/27/84	0.21	9/80 80 80	160	5/50
	REPORT Test	യാ [`] നാ	0.33/9	0,034	530	0, 00 °C	6/69 6/7	6/6n	(10, 01)	I o	67 67 F	06/25/84	06/27/84	0.21	0. 25° a	6/6/	ចិ/ចិក
	l Serv RESULTS BY	330	0.30	5/ 6n	250	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	5 5 VO	6/6n 140	(10, 49	0.10	6/60	06/25/84	06/27/84	0.93	59/9 1.32	5 O Cd	6/65
	Analytica	160		0.10	330	e / 62 83	6/60	6/60	49.69	0.09	5/55 \$C'_	06/25/84	06/27/84	0.12	0. 43	6, 6, 88	6/60
CORPORATION	PAGE 4 RECEIVED: 06/21/84	CU E	C.2 .	, A	W.E.	65 W	NO3_IC	PB_GA	PCB_SS	A PER	√4. √4. √4. √4. √4. √4. √4. √4.	TATED W. date complete	date complete	8E.8A	30	N.E.	ug/ml (

H-20

LAB # 84-06-190

Analytical Serv REPORT RESULTS BY TEST

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Sample 11	יבורבובה סווני	9	6/67 0 51	6/60	500	5/6n	in the second se	5 O	5/5n	120	6/60	~; (n)	5/65	5	6/6n		6/60 6/60	£30	6/6a	ે વિ :	δ √ δ π ·	oʻ,	5/5n	0 / CD		
TEST CODE		AC L		i ug/m1		: 69/m]	LI G	CNIETA	i mg/L	<u>س</u>		н-2			1/6m :	£3.50			TE LI			77 77		i co/mi	25 mg	5/67 1

PAGE 5 RECEIVED: 06/21/84

	ABOVE
# 84-09-140	FROM
**	INCED
LAB	CON

PAGE 6 RECEIVED: 06/21/84	Analytical Serv REPORT RESULTS BY TEST	CONTIN
mg/L	0,10	
AL DE		
t pH units		
3	06/25/84	
date complete ;		
~	06/27/84	
date complete :		
# # # # # # # # # # # # # # # # # # #	0.31	
: ug/m1	6/60	
<u> </u>	0.65	
i mg/L	09/0	
	1	
i ug/m1	5/6n	

Analytical Serv E CANONATION

REPORT Results by Sample

LAB # 84-06-190

RECEIVED: 06/21/84

SAMPLE ID TSED-07

FRACTION OIB TEST CODE HIRCRA NAME RCRA Herbicides

Date & Time Collected not specified

Category

DATE EXTRACTED 07/09/84

DATE INJECTED 07/16/84 ANALYST DRL

VERIFIED BY MSF

DET. LIMIT

RESULT

COMPOUND

2, 4-B

OTHER HERBICIDES

RESULT

BET. LIMIT

2, 4, 5-TP (Silvex)

(V)

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE ID 1SED-07 H-23

FRACTION OIB TEST CODE PIRCRA NAME RCRA Pesticides

Date & Time Collected not specified

VERIFIED BY MSF

Category

DATE EXTRACTED <u>06/25/84</u> CONCENTRATION FACTOR DET. LIMIT

RESULT

COMPOUND

∴ G02

Lindane

OTHER PESTICIDES

DATE INJECTED 06/29/84 ANALYST DRL

RESULT

DET. LIMIT

∴ 002 Endrin

. 020 ∴ Methoxychlor

. 020 ∴

Toxaphene

MOTES AND DEFINITIONS FOR THIS REPORT.

Results by Sample Analytical Serv

REPORT

Continued From Above LAB # 84-06-190

RECEIVED: 06/21/84

SAMPLE 1D TSED-07

FRACTION OIB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

Category

All results reported in micrograms/liter unless otherwise specified ND = not detected at the specified detection limit.

FRACTION 02B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified SAMPLE ID TSED-08

Category

DATE EXTRACTED 07/09/84

DATE INJECTED 07/16/84 ANALYST DRL

VERIFIED BY MSF

DET. LIMIT

RESULT

COMPOUND

2,4-5

OTHER HERBICIDES

BET. LIMIT RESULT

> 2,4,5-TP (Silvex) H - 24

NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

SAMPLE 10 1SED-08

FRACTION O2B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR

DATE INJECTED <u>06/29/84</u> ANALYST <u>DRL</u>

OTHER PESTICIDES

RESULT

VERIFIED BY MSF

RESULT COMPOUND △ 002

Lindane

DET. LIMIT

<. G02 >

Endrin

Methoxychlor

₹.02

RECEIVED: 06/21/84

REPURT Results by Sample Analytical Serv

LAB # 84-06-190 Continued From Above

SAMPLE 1D TSED-08

FRACTION O2B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified

Category

Toxaphene

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 1D 1SED-09

FRACTION O3B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category

Category

VERIFIED BY MSF

DATE EXTRACTED 07/09/84 CONCENTRATION FACTOR COMPOUND

H-25

RESULT

DET. LIMIT

DATE INJECTED 07/16/84 ANALYST DRL

OTHER HERBICIDES

DET. LIMIT

2, 4, 5-TP (Silvex)

ς Vi

2, 4-B

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 1D TSED-09

FRACTION O3B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

DATE INJECTED 06/29/84 ANALYST BRE

VERIFIED BY MSF

DATE EXTRACTED 06/25/84

PAGE 10 RECEIVED: 06/21/84

Continued From Above

LAB # 84-06-190

Analytical Serv REPORT Results by Sample

TEST CODE PIRCRA NAME RCRA Pesticides ected not specified Category	RESULT BET. LIMIT				
FRACTION OB TEST CODE PIRCRA N Date & Time Collected not specified	OTHER PESTICIDES				
FRACTION OBB	DET. LIMIT				
	RESULT	<. 002	<.002	Ċ. 02	₹. 02
SAMPLE ID TSED-09	COMPOUND	Lindane	Endrin	Methoxychlor	Toxaphene

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

H-26

FRACTION 04B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category Category SAMPLE 1D TSED-10

VERIFIED BY MSF

DET. LIMIT

RESULT

DATE INJECTED 07/16/84 OTHER HERBICIDES ANALYST DRL DET. LIMIT о У (N (V RESULT CONCENTRATION FACTOR COMPOUND 2, 4-B 2,4,5-TP (Silvex)

Ali results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

Analytical Serv

REPORT Results by Sample

LAB # 84-06-190

RECEIVED: 06/21/84

SAMPLE ID ISED-10

FRACTION 04B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified

DATE EXTRACTED 06/25/84

DATE INJECTED 06/29/84 ANALYST DRL

VERIFIED BY MSF

Category

CONCENTRATION FACTOR

RESULT

OTHER PESTICIDES

BET. LIMIT

DET. LIMIT

RESULT

COMPOUND Lindane Endrin Methoxychlor

< 005

<. G02

♦ 05 . 02

Toxaphene

H-27

NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

FRACTION 05B TEST CODE HIRCRA NAME RCRA Herbicides

Date & Time Collected not specified

SAMPLE ID ISED-11

DATE INJECTED 07/16/84 ANALYST BRL OTHER HERBICIDES

DET. LIMIT

VERIFIED BY MSF

Category

DATE EXTRACTED 07/09/84 CONCENTRATION FACTOR COMPOUND

RESULT

DET. LIMIT

(d)

2, 4--₽

(V

2,4,5-TP (Silvex)

MOTES AND DEFINITIONS FOR THIS REPORT.

CORPORATION

RECEIVED: 06/21/84

SAMPLE ID TSED-11

REPORT Results by Sample Analytical Serv

Continued From Above LAB # 84-06-190

FRACTION 05B TEST CODE HIRCRA NAME RCRA Herbicides

Category

Date & Time Collected not specified

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

FRACTION OSB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category Category SAMPLE ID ISED-11

DATE EXTRACTED 06/25/84

RESULT

COMPOUND

<. 002

Lindane

<. 002 <. 002

Endrin

H-28

VERIFIED BY MSF

DATE INJECTED 06/29/84 ANALYST DRL DET. LIMIT

OTHER PESTICIDES

RESULT

Toxaphene Methoxychlor

÷ 02

. O2

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

NOTES AND DEFINITIONS FOR THIS REPORT.

SAMPLE ID TSED-12

FRACTION OGB TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category

RESULT DATE EXTRACTED 07/09/84 COMPOUND CONCENTRATION FACTOR

OTHER HERBICIDES

DATE INJECTED 07/16/84 ANALYST DRL

VERIFIED BY MSF

DET. LIMIT

RECEIVED: 06/21/84

REPORT Results by Sample Analytical Serv

Continued From Above LAB # 84-06-190

SAMPLE ID TSED-12

FRACTION OGB TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified

Category

2,4-5

γ γ

2, 4, 5-TP (Silvex)

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 1D 1SED-12

FRACTION OGB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

VERIFIED BY MSF

Category

DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR

DET. LIMIT

RESULT

COMPOUND

Lindane

H-29

DATE INJECTED 06/29/84 ANALYST DRL

OTHER PESTICIDES

BET. LIMIT

<. 002 Endrin

<.002

∴ 02

Methoxychlor

∴ 02

Toxaphene

MOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

RECEIVED: 06/21/84

SAMPLE 1D ISED-13

Analytical Serv

REPURT

LAB # 84-06-190

Results by Sample

FRACTION O7B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category

Category

DATE EXTRACTED 07/09/84

DATE INJECTED 07/16/84 ANALYST DRL

VERIFIED BY MSF

CONCENTRATION FACTOR

DET. LIMIT RESULT

COMPOUND

OTHER HERBICIDES

2, 4-0

Ç)

BET. LIMIT

2, 4, 5-TP (Silvex)

Ω ∵

NOTES AND DEFINITIONS FOR THIS REPORT. $ND_c = not$ detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

SAMPLE 10 15ED-13

FRACTION O7B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

DATE INJECTED <u>06/29/84</u> ANALYST <u>DRL</u>

VERIFIED BY MSF

Category

DATE EXTRACTED <u>06/25/84</u> CONCENTRATION FACTOR DET. LIMIT

RESULT

COMPOUND

OTHER PESTICIDES

RESULT

DET. LIMIT

∴ 002 Lindane Endrin

<. G02 <

₹. 02

Methoxychlor

Toxaphene

Ç 053

NOTES AND DEFINITIONS FOR THIS REPORT.

LAB # 84-06-190 Continued From Above VERIFIED BY MSF VERIFIED BY MSF FRACTION O7B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category FRACTION OBB TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category FRACTION OBB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category Category Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified. DATE INJECTED 07/16/84 ANALYST DRL OTHER HERBICIDES DATE INJECTED 06/29/84 ANALYST DRL OTHER PESTICIDES NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. REPURT ND = not detected at the specified detection limit. Results by Sample DET. LIMIT Analytical Serv DET. LIMIT \ \ \ O < > RESULT RESULT <. 002 ∴ 002 C. 002 <.02 DATE EXTRACTED 07/09/84 CONCENTRATION FACTOR DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR CORPORATION COMPOUND 2,4-0 2, 4, 5-TP (Silvex) COMPOUND Lindane Endrin Methoxychlor RECEIVED: 06/21/84 SAMPLE 10 TSED-13 SAMPLE 10 TSED-14 SAMPLE 10 1SED-14 H - 31

BET. LIMIT

DET. LIMIT

RECEIVED: 06/21/84 PAGE 16

Results by Sample Analytical Serv

REPORT

Continued From Above LAB # 84-06-190

FRACTION OBB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

SAMPLE ID TSED-14

Category

Toxaphene

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE ID TSED-15

FRACTION OPB TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category

Category

H - 32

DATE EXTRACTED 07/09/84 CONCENTRATION FACTOR DET. LIMIT

RESULT

COMPOUND

2,4-0

OTHER HERBICIDES

DATE INJECTED 07/16/84 ANALYST DRL

VERIFIED BY MSF

RESULT

2, 4, 5-TP (Silver)

Ÿ

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 10 TSED-15

FRACTION OPB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

DATE INJECTED 06/29/84 ANALYST DRL

VERIFIED BY MSF

Category

DATE EXTRACTED 06/25/84

CORPORATION RECEIVED: 06/21/84

REPORT Results by Sample Analytical Serv

Continued From Above LAB # 84-06-190

SAMPLE ID TSED-15

FRACTION OPB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified

Category

DET. LIMIT

RESULT

COMPOUND.

BET. LIMIT

∴ 02 < 005 C 002 Lindane Endrin Methoxychlor

. 020 ∴

Toxaphene

OTHER PESTICIDES

RESULT

H-33

NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

SAMPLE ID TSED-16

FRACTION 10B TEST CODE HIRCRA NAME ACRA Herbicides Date & Time Collected not specified VERIFIED BY MSF

Category

DATE EXTRACTED 07/09/84

DATE INJECTED 07/16/84 ANALYST DRL OTHER HERBICIDES

2, 4-8

(1) (2)

DET. LIMIT

RESULT

COMPOUND

BET. LIMIT

2,4,5-TP (Silvex)

(V)

NOTES AND DEFINITIONS FOR THIS REPORT.

ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified

RECEIVED: 06/21/84

SAMPLE 10 TSED-16

REPORT Results by Sample Analytical Serv

LAB # 84-06-190

FRACTION 10B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

DATE EXTRACTED 06/25/84

DATE INJECTED <u>06/29/84</u> ANALYST <u>DRL</u>

VERIFIED BY MSF

DET. LIMIT

OTHER PESTICIDES

DET. LIMIT

RESULT

< 005 ∴ 002 RESULT COMPOUND Lindane Endrin Methoxychlor

Ç 05 ∵

Toxaphene

H - 34

MOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

SAMPLE 1D 15ED-18

FRACTION 118 TEST CODE HIRCRA NAME ACRA Herbicides

Date & Time Collected not specified

DATE EXTRACTED 07/09/84

CONCENTRATION FACTOR

DATE INJECTED 07/16/84 ANALYST

OTHER HERBICIDES

DET. LIMIT

RESULT

COMPOUND

RESULT

VERIFIED BY MSF

Category

2,4-5

(V)

2,4,5-TP (Silvex)

α V

MOTES AND DEFINITIONS FOR THIS REPORT.

PAGE 18

RECEIVED: 06/21/84

REPORT Results by Sample Analytical Serv

Continued From Above LAB # 84-06-190

SAMPLE 1D TSED-18

FRACTION 11B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category

All results reported in micrograms/liter unless otherwise specified. SAMPLE 10 1SED-18

ND = not detected at the specified detection limit.

FRACTION 11B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR

DATE INJECTED 06/29/84 ANALYST DRL

VERIFIED BY MSF

DET. LIMIT

RESULT

COMPOUND

<.002

Lindane

< 002

Endrin

H - 35

OTHER PESTICIDES

RESULT

DET. LIMIT

÷. 02 . 02 . Methoxychlor Toxaphene

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

PAGE 20 RECEIVED: 06/21/84

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEMHERE 12A : LOG_IN

Analytical Serv REPORT 04/26/85 11:52:34

LAB # 84-06-206

Machin	CERTIFIED BY	CONTACT CONDVER	are reported in uq/q.			ne detection limit. les between	
PREPARED <u>Radian Analytical Services</u> BY <u>8501 MoPac Blvd.</u> P. O. Box 9948		PHONE (512) 454-4797	RCRA Herbicides and RCRA Pesticides are	Duplicate of report of OB/15/84.	Footnotes and Comments	* Indicates a value less than 5 times the defection limit. Potential error for such low values ranges between 50 and too?	. VAA7 730
REPORT Radian TO B1. 4 Austin	ATTEN William Little	CLIENT TINKER SAMPLES 7 OMPANY Tinker AFB		sediments Gancari	TRANS Fed Ex	# 212-027-21-05 # 3829	ילק ק
8 9 9	A	CLIENT COMPANY FACTITY		WORK ID TAKEN	T	P. D.	

<u>specific matrix was not within acceptable limits indicating</u> <u>e Indicates that spike recovery for this analysis on the</u> an interferent present

Special Digestion Method Special Digestion Method Total Organic Carbon Selenium, low level PHEN A Total Phenolics Analytical Serv TEST CODES and NAMES used on this report Zinc, ICPES Ha PH A PREP K PREP X SE GA ZN E TOC Mercury, Cold Vapor Arsenic, low level Manganese, ICPES Chromium, ICPES RCRA Herbicides RCRA Pesticides Lead, low level Cadmium, ICPES Barium, ICPES Total Cyanide Copper, ICPES Nickel, ICPES AG E Silver, ICPES AS GA Arsenic, low BA E Barium, ICPES Fluoride, IC Mitrate, IC CD E CATOTA PB GA PCB SS HIRCRA PIRCRA MO3 IC CR E HG CA CUE T T MI E TSED-26 TSED-27 TSED-19 TSED-21 TSED-22 TSED-24 TSED-25

PCBs in Soil

H - 37

임임임임임임

Analytical Serv REPORT RESULTS BY TEST

TEST CODE	9	Sample 02	Sample 03	Sample 04	Sample 05
<u>.</u>	t tentered units!	(entered units)	(entered units)	(entered units)	(entered units)
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# C	5/5n	តិ/ចិក	6/6n	6/60	ចិ/ចិក
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i ug/m1	0/00	8,0n		* * * * * * * * * * * * * * * * * * *	년 ~
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PB GA		n () n () n	7 7 7 7 7 7 7 7	on on UCO oradi	27
ישישישן מיט ו	6/6n	6/60	6/60	6/60	5/53
- 10 33 - 19/9	2	2	2	2	2

PAGE 2 RECEIVED: 06/22/84

CORPORATION

PAGE 3		Analitical Conv	Tanasa	- 40 # 08-0	30.6	
RECEIVED: 06/22/84		RESULTS BY	TEST TEST	CONTINUED FROM ABOVE	evo Om above	
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	06/27/84	06/27/84	06/27/84	06/27/84	06/27/84	
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LEST CODE 1	Sample 06 (entered units)	Sample 07				
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BA E	920	5 / S & C & C & C & C & C & C & C & C & C &				
	6/60	2 C				
CNTOTA	6/8n (0.)	5 CO)			*	
Cas.	6/60 6/07	g 6 UC 7 CC				
i ug/ml	6/60	5/60				

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-06-206	FROM
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LAB	CON

REPORT 3 BY TEST	5,	<u>Б</u>	<u>α</u> ,	ĺσι (a)	ÇTI	ත	[©] л		্জা				с п	ଫା	251
I Serv RESULTS	O	0.30 0.30 0.30	19.09	gi com urai	3	Ö च्या 3 √0	95	10 V	7.16	06/27/84	06/27/84	0.43	(C)	ັດ Or ສື	/65
Analytical	ار بارا الماري الماري	0,036	500	6 (G)	5	5/6/ 5/6/	08/8n	700	6/60						
PAGE 4 RECEIVED: 06/22/84	[H6_CA	MN E			7/5# J. P. P. P. P. P. P. P. P. P. P. P. P. P.						W	1w,6n = 100	N E	ug/ml ;

FRACTION OIB TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category Results by Sample RECEIVED: 06/22/84 SAMPLE ID TSED-19

LAB # 84-06-206

REPORT

Analytical Serv

DATE EXTRACTED 07/13/84 CONCENTRATION FACTOR

Category

DATE INJECTED 07/26/84 ANALYST DRL

VERIFIED BY LLN

DET. LIMIT

RESULT

COMPOUND

OTHER HERBICIDES

2,4,5-TP (Silvex)

Ç0.5

€0.2

2, 4-B

RESULT

DET. LIMIT

All results reported in micrograms/liter unless otherwise specified NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

FRACTION OIB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

SAMPLE ID ISED-19

DATE INJECTED 07/02/84 ANALYST DRL

VERIFIED BY LLN

Category

OTHER PESTICIDES

DET. LIMIT

RESUL 1

COMPOUND

DATE EXTRACTED 07/01/84

∴ 002

Lindane

RESULT

BET. LIMIT

Endrin

<. 002

<.02

Methoxychlor

₩ 90 90

Toxaphene

MOTES AND DEFINITIONS FOR THIS REPORT.

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DRT	Sample Continued From Above	TEST CODE PIRCRA NAME RCRA Pesticides lected not specified Category	tion limit. Unless otherwise specified.	TEST CODE HIRCRA NAME RCRA Herbicides lected not specified Category	INJECTED 07/26/84 VERIFIED BY LLN ANALYST DRL	OTHER HERBICIDES RESULT BET. LIMIT			THIS REPORT. tion limit. . unless otherwise specified.	TEST CODE PIRCRA NAME RCRA Pesticides lected not specified Category	DATE INJECTED <u>07/02/84</u> VERIFIED BY <u>LLN</u> ANALYST <u>DRL</u>	OTHER PESTICIDES RESULT DET. LIMIT			
Analytical Sarv	Results by Sample	Date & Time Collected not	≅	FRACTION 02B TEST CODE Date & Time Collected not	DATE	BET. LIMIT			DEFINITIONS FOR 1 specified detect nicrograms/liter	FRACTION OZB TEST CODE Date & Time Collected not	DATE	DET. LIMIT		alian manuful and a farming and	
			tected at reported		07/13/84	RESULT	<0.2	<u> </u>	NOTES A tected at reported		07/01/84	RESULT	<.002	<. 002	0 0 0
CORPORATION PARE 6 BCPCTUCD. ALTORA	MCCC1VCD. 00/26/84	SAMPLE ID ISED-19	ND = not de All results	SAMPLE ID TSED-21	DATE EXTRACTED CONCENTRATION FACTOR	COMPOUND	2, 4-B	2, 4, 5-TP (Silvex)	ND = not All resul	SAMPLE ID TSED-21	DATE EXTRACTED O	COMPOUND	Lindane	Endrin	Methoxychlor

REPORT Results by Sample Analytical Serv RECEIVED: 06/22/84 SAMPLE ID ISED-21

Continued From Above LAB # 84-06-206

FRACTION 02B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified

Category

Toxaphene

∴ 02

NOTES AND DEFINITIONS FOR THIS REPORT.

FRACTION O3B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category Category ${\sf ND}={\sf not}$ detected at the specified detection limit. All results reported in micrograms/liter unless otherwise specified. SAMPLE 10 TSED-22

DATE EXTRACTED 07/13/84

DATE INJECTED 07/26/84 ANALYST DRL

OTHER HERBICIDES

VERIFIED BY LLN

2, 4-₽ 2,4,5-TP (Silvex)

DET. LIMIT

RESULT

COMPOUND

H-43

0.2

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 10 15ED-22

FRACTION OSB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

DATE INJECTED 07/02/84 AMALYST DRL

VERIFIED BY LLN

DATE EXTRACTED 07/01/84

PAGE 8 RECEIVED: 06/22/84	Ana	Analytical Serv Results by Sample	REPORT Sample	LAB # 84 Continue	LAB # 84-06-206 Continued From Above	
SAMPLE ID ISED-22	en men entre entre de la mente de la constante de la constante de la constante de la constante de la constante	FRACTION O3B	FRACTION 03B TEST CODE PIRCRA NAME RCRA Pesticides	NAME ACRA PR	sticide approximate	
		Date & Time Co	llected not specifi	ed Ca	Category	1
COMPOUND	ND RESULT	DET. LIMIT	OTHER PESTICIDES	REBULT	DET. LIMIT	
Lindane	ne <. 002					
Endrin	in <. 002					
Methoxychlor	or <. 02	111111111111111111111111111111111111111				
Toxaphene	ne < 02					

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. H-44

SAMPLE ID ISED-24		FRACTION 04B Date & Time Co	FRACTION 04B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category	NAME RCRA H	Herbicides Category	
DATE EXTRACTED <u>07/13/84</u> CONCENTRATION FACTOR	77/13/84	DATE	DATE INJECTED 07/26/84 ANALYST DRL	· 3	VERIFIED BY LLN	
COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT	DET. LIMIT	MIT
2, 4-B	00.2	***************************************				
2,4,5-TP (Silvex)	₹0.2	- The state of the				

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

	
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FRACTION 04B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category Serv REPORT Results by Sample utical Serv RECEIVED: 06/22/84 SAMPLE 1D TSED-24

LAB # 84-06-206

DATE INJECTED 07/02/84 ANALYST DRL DATE EXTRACTED 07/01/84 CONCENTRATION FACTOR

VERIFIED BY LLN

DET. LIMIT RESULT

OTHER PESTICIDES

RESULT

DET. LIMIT

<. 002 ∴ 002 COMPOUND Lindane Endrin Toxaphene Methoxychlor

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H - 45

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

FRACTION 05B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category

SAMPLE ID TSED-25

DATE INJECTED 07/26/84 ANALYST DRL

DATE EXTRACTED 07/13/84 CONCENTRATION FACTOR

DET. LIMIT

OTHER HERBICIDES

VERIFIED BY LLN

COMPOUND 2,4-5

RESULT

000

\$ 5

2,4,5-TP (Silvex)

BET. LIMIT

MOTES AND DEFINITIONS FOR THIS REPORT.

FRACTION OSB TEST CODE HIRCRA NAME RCRA Herbicides Category Results by Sample RECEIVED: 06/22/84 SAMPLE 1D TSED-25

Continued From Above LAB # 84-06-206

REPORT

Analytical Serv

Date & Time Collected not specified

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

VERIFIED BY LLN BET. LIMIT FRACTION 05B TEST CODE PIRCRA NAME RCRA Pesticides Category RESULT Date & Time Collected not specified DATE INJECTED 07/03/84 ANALYST DRL OTHER PESTICIDES DET. LIMIT ₹. 02 ∴ 002 RESULT <. 002 <. 002 DATE EXTRACTED 07/01/84 COMPOUND CONCENTRATION FACTOR Lindane Endrin Methoxychlor SAMPLE ID TSED-25 H-46

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

Toxaphene

RCRA Herbicides Category	VERIFIED BY <u>LLN</u>
FRACTION 06B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category	DATE INJECTED <u>07/26/84</u> ANALYST <u>DRL</u>
SAMPLE ID TSED-26	DATE EXTRACTED <u>07/13/64</u> CONCENTRATION FACTOR

DET. LIMIT

RESULT

OTHER HERBICIDES

DET. LIMIT

RESULT

COMPOUND

RECEIVED: 06/22/84

Continued From Above FRACTION 068 TEST CODE HIRCRA NAME RCRA Herbicides Results by Sample SAMPLE ID TSED-26

Date & Time Collected not specified

Category

LAB # 84-06-206

REPURT

Analytical Serv

2, 4, 5-TP (Silvex)

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2,4-5

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

FRACTION OGB TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category SAMPLE ID TSED-26

DATE EXTRACTED 07/01/84

OTHER PESTICIDES DATE INJECTED 07/03/84 ANALYST DRL

DET. LIMIT

RESULT

BET. LIMIT

VERIFIED BY LLN

COMPOUND H-47 Lindane

Endrin

Methoxychlor

<. 002 <

<. 02 ∴ 02 <. 002

<.02 Toxaphene

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

REPORT Results by Sample Analytical Serv

LAB # 84-06-206

RECEIVED: 06/22/84

SAMPLE 10 15ED-27

FRACTION O7B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category

DATE EXTRACTED 07/13/84

DATE INJECTED 07/26/84 ANALYST DRL

VERIFIED BY LLN

CONCENTRATION FACTOR

DET. LIMIT RESULT

COMPOUND

OTHER HERBICIDES

RESULT

2,4,5-TP (Silvex)

€0.2

2, 4-0

Ć0. 2

NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

All results reported in micrograms/liter unless otherwise specified.

SAMPLE 10 15ED-27

FRACTION O7B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified

DATE INJECTED 07/03/84 ANALYST DRL

VERIFIED BY LLN

Category

DATE EXTRACTED 07/01/84

DET. LIMIT

RESULT

COMPOUND

OTHER PESTICIDES

RESULT

DET. LIMIT

∴ 002

Endrin

<. G02

Lindane

Methoxychlor

÷. 02

∴ 02

Toxaphene

NOTES AND DEFINITIONS FOR THIS REPORT.

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PAGE 13 RECEIVED: 06/22/84

Analytical Serv

Serv REPORT Results by Sample

LAB # 84-06-206 Continued From Above

SAMPLE ID ISED-27

FRACTION O7B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

RECEIVED: 07/18/84

Analytical Serv REPORT 04/26/85 11:54:42

LAB # 84-07-090

<u>specific matrix was not within acceptable limits indicating</u> * Indicates a value less than 5 times the detection limit. CONTACT CONDVER second column confirmation performed on all three @ Indicates that spike recovery for this analysis on the CERTIFIED BY Potential error for such low values ranges between Analytical Serv TEST CODES and NAMES used on this report Services Footnotes and Comments Duplicate of report of OB/07/84 Austin, Texas 78766 PREPARED Radian Analytical samples on this work order 8501 MoPac Blvd (512) 454-4797 Box 9948 an interferent present. 50 and 100%. **≻** PHONE ATTEN Note: SAMPLES SAMPLE IDENTIFICATION ATTEM William Little 212-027-21-05 Tinker AFB WORK ID wells, 601 REPORT Radian Austin CLIENT TINKER Fed Ex 3850 TYPE COMPANY TAKEN P. O. # FACILITY INV 9 리엠잉 H-51

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PAGE 2 RECEIVED: 07/18/84

Analytical Serv Results by Sample

ACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC te & Time Collected not specified Category	ANALYST RGS INSTRUMENT D	SCAN COMPOUND RESULT	Trichloroethene 0.4	Dibromochloromethane * ND	1, 1, 2-Trichloroethane * ND	cis-1,3-Bichloropropene * ND	2-Chloroethylvinyl Ether ND	Bromoform NB	1, 1, 2, 2-Tetrachloroethane # NB	Tetrachloroethylene # MD	Chlorobenzene 20.5	1,3-Dichlorobenzene NB	7 1,2-Bichlorobenzene 8.4	1,4-Bichlorobenzene ND				
FR	ILEB DATE INJECTED <u>07/24/84</u> TOR	N COMPOUND RESULT	Chloromethane ND	Bromomethane ND	Vingl Chloride ND	Chloroethane ND	Methylene Chloride 2.0	Trichlorofluoromethane 1.8	1,1-Dichloroethene ND	1,1-Dichloroethane 1.7	trans-1,2-Dichloroethene 0.4	Chloroform ND	1,2-Dichloroethane ND	1,1,1-Trichloroethane ND	. Carbon Tetrachloride ND	Bromodichloromethane NE	1, 2-Bichloropropane ND	trans-1,3-Dichloropropene ND
SAMPLE ID 60	DATA FILE CONC. FACTOR	SCAN			н-	-52	7	2		n	4							

RECEIVED: 07/18/84

Results by Sample Analytical Serv

REPORT

LAB # 84-07-090 Continued From Above

SAMPLE ID 6D

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. All results reported in <u>ug/L</u> unless otherwise specified. SCAN = scan number or retention time on chromatogram.

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PAGE 4 RECEIVED: 07/18/84

Analytical Serv Results by Sample

TEST CODE GC 601 NAME EPA Method 601/GC ected not specified Category	ANALYST RGS VERIFIED BY JSG INSTRUMENT b COMPOUNDS DETECTED 6	SCAN COMPOUND RESULT	Trichloroethene 1.3	Dibromochloromethane * ND	1, 1, 2-Trichloroethane * ND	cis-1,3-Dichloropropene * NB	2-Chloroethylvinyl Ether ND	Bromoform ND	1, 1, 2, 2-Tetrachloroethane # NB	Tetrachloroethylene # NB	Chlorobenzene MB	1,3-Dichlorobenzene NB	1,2-Dichlorobenzene NB	1,4-Dichlorobenzene NB				
FRACTION O2A TEST CODE Date & Time Collected not		COMPOUND RESULT	Chloromethane ND	Bromomethane ND	Vinyl Chloride ND	Chloroethane 1.1	Methylene Chloride 1.9	Trichlorofluoromethane 7.6	1,1-Dichloroethene ND	1,1-Dichloroethane ND	trans-1,2-Dichloroethene ND	Chloroform 4.6	1, 2-Bichloroethane 4.9	1, 1, 1-Trichloroethane ND	Carbon Tetrachloride ND	Bromodichloromethane ND	1, 2-Dichloropropane ND	trans-1, 3-Dichloropropene ND
SAMPLE 10 66	DATA FILE	SCAN				1	2	М-:	54			4	S)					and the state of t

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REPORT Results by Sample Analytical Serv

LAB # 84-07-090 Continued From Above

SAMPLE 1D 66

FRACTION <u>02A</u> TEST CODE <u>GC 601</u> NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

CORPORATION		07/18/84
***************************************	PAGE 6	RECEIVED:

PAGE 6 RECEIVED: 07/18/84	Analytical Serv Results by	REPORT by Sample	LAB # 84-07-090
SAMPLE ID 7F	FRACTION O. Date & Time	FRACTION O3A TEST CODE GC Date & Time Collected not sp	GC 601 NAME EPA Method 601/GC specified Category
DATA FILE COMC. FACTOR	B DATE INJECTED 07/25/84	ANALYST ANALYST INSTRUMENT	VERIFIED BY JSG COMPOUNDS DETECTED 10
SCAN	COMPOUND	T SCAN	COMPOUND
	Chloromethane 63.8	8	Trichloroethene 0.9
	Bromomethane		Dibromochloromethane * NB
2	Vinyl Chloride 10.	 	1, 1, 2-Trichloroethane * NB
[Chloroethane 15.	(n)	cis-1,3-Bichloropropene * NB
4	Methylene Chloride 6.	- <u></u> -	2-Chloroethylvinyl Ether NB
ι)	Trichlorofluoromethane 4.	4	Bromoform ND
 -56	1, 1-Dichloroethene	- Q	1, 1, 2, 2-Tetrachloroethane # ND
9	1, 1-Dichloroethane 2.	 	Tetrachloroethylene # ND
	trans-1, 2-Dichloroethene	6 GN	Chlorobenzene 5.7
	Chloroform 15.	0-	1,3-Bichlorobenzene ND
	1,2-Bichloroethane	ND ND	1,2-Dichlorobenzene ND
	1, 1, 1-Trichloroethane	ND 10	1,4-Dichlorobenzene 6.0
	Carbon Tetrachloride N	Q	
	Bromodichloromethane N	QN	
	1, 2-Dichloropropane N	GN	
	trans-1,3-Dichloropropene N	ON .	

CORPORATION

RECEIVED: 07/18/84

Results by Sample Analytical Serv

LAB # 84-07-090 Continued From Above

REPORT

SAMPLE 10 7F

FRACTION O3A TEST CODE GC 601 NAME EPA Method 601/GC Date % Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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PAGE 8 RECEIVED: 07/18/84

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

DUP 601 DUP 601 DUP 601 01B 02B 03B

H-58

CORPORATION

RECEIVED: 07/18/84

Serv REPORT 04/26/85 11:55:37

LAB # 84-07-093

Analytical Serv

CONTACT CONDVER CERTIFIED BY Services Austin, Texas 78766 PREPARED Radian Analytical 8501 MoPac Blvd (512) 454-4797 Box 9948 р. О PHONE ATTEN SAMPLES ATTEN William Little Tinker AFB REPORT Radian Austin TINKER COMPANY CLIENT FACILITY

Duplicate of report of OB/09/84

7/16/84 - 7/17/84, NPS/HG

federal express

E CE

TYPE

212-027-21-05

INC

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6D,

WORK ID Monitor Wells 7F,

TAKEN TRANS

* Indicates a value less than 5 times the detection limit. Potential error for such low values ranges between Footnotes and Comments 50 and 100%

specific matrix was not within acceptable limits indicating <u>e Indicates that spike recovery for this analysis on the</u>

an interferent present.

Analytical Serv TEST CODES and NAMES used on this report M625 A Method 625 Acid Compounds M625 B Method 625 Base/Neutrals MS 624 EPA Method 624/GC-MS

SAMPLE IDENTIFICATION 7F, Area D

H-59

66, Bldg 3001 의웨잉

SAMPLE ID 7F, Area D

REPORT Analytical Serv

Results by Sample

Category

LAB # 84-07-093

FRACTION OIA TEST CODE M625 A NAME Method 625 Acid Compounds Date & Time Collected 07/17/84 Category

DATE INJECTED 07/31/84 DATE EXTRACTED 07/25/84 DATA FILE 2CU07093C01

BMB INSTRUMENT

VERIFIED BY LAK COMPOUNDS DETECTED

NPDES SCAN	EPA	COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESULT
114	21A	2, 4, 6-trichlorophenol	ÜN	1 7A	58A	4-nitrophenol	Z
84	22A	4-chloro-3-methylphenol	Q	ψ Ψ	59A	2,4-dinitrophenol	N
1.4	24A	2-chlorophenol	QN	4. 4.	60A	2-methyl-4,6-dinitrophenol	N
\$5 45	31A	2,4-dichlorophenol	QN	₽ 8	64A	pentachlorophenol	200
ጚ ዘ−60	34A	2,4-dimethylphenol	Q	10A	65A	phenol	QN
64	57A	2-nitrophenol	Ö	•••			

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram. All results reported in ug/l unless otherwise specified.

All results reported in ug/l unless otherwise specified. ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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Analytical Serv Results by Sample

NAME Method 625 Base/Neutrals Category	BWS VERIFIED BY LAK COMPOUNDS DETECTED 3	COMPOUND	M-nitrosodimethylamine ND	M-nitrosodiphenylamine NB	M-nitrosodi-n-propylamine ND	is(2-ethylhexyl)phthalate B	butyl benzyl phthalate NE	di-butyl phthalate NB	di-n-octyl phthalate NB	diethyl phthalate 32	dimethyl phthalate ND	benzo(a)anthracene A ND	benzo(a)pyrene	benzo(b)fluoranthene * NE	benzo(k)fluoranthene * NB	chrysene A ND	acenaphthylene MD	anthracene B ND
ODE M625 B 07/17/84	ANALYST INSTRUMENT	EPA	618	628	638	66B bi	678	889	869	708	71B	728	738	748	758	768	778	788
Collected 07/1	AN INSTE	NPDES SCAN	418	43B	42B	138 1640	158	26B	298	24B 1023	258	ឌ	89	73	86	188	25	ae
ACTION OIA te & Time Col	07/25/84 07/31/84	RESULT N	ũ	GN N	<u>S</u>	Q	Q	Q	Q	Q	Q	길	QN	QN	Q	Q	ũ	NB
FRACTI Date &	DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1, 2, 4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl}ether	2-chloronaphthalene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2,4-dinitratoluene	2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	enyl phenyl ether
Area D	20007093001		m	Ø1		m	m											4-chlorophenyl
H		IN EPA	18	38	88	98	12B	188	208	258	26B	<u>3</u> 27B	288	900 800	368	378	398	40B
SAMPLE ID 7F, Area D	DATA FILE CONC. FACTOR	NPDES SCAN	18	48	468	338	368	118	H-	ଷ୍ଟ ଆ ମ	218	22B 493	238	278	28B	298	318	178

ATION		
CORPOR		07/18/84
N	PAGE 4	RECEIVED:

LAB # 84-07-093 Continued From Above

Analytical Serv REPORT Results by Sample

E M625 B NAME Method 625 Base/Neutrals/17/84 Category	79B benzo(ghi)perylene NB	BOB fluorene ND	818 phenanthrene B ND	82B dibenzo(a,h)anthracene NB	83B indeno(1,2,3-cd)pyrene ND	84B pyrene ND		•		. pa
TEST CODE M625 B	88	328	448	198	37B	458			atogram.	ise specified
7F. Area D FRACTION OIA TEST CODE Date & Time Collected 07/1	418 4-bromophenyl phenyl ether ND	42B bis(2-chloroisopropyl)ether NB	43B bis(2-chloroethoxy)methane ND	52B hexachlorobutadiene ND	53B hexachlorocyclopentadiene ND	548 isophorone ND	55B naphthalene ND	DEFINITIONS FOR THIS REPORT nzene ND	= scan number or retention time on chromatogram	results reported in <u>uq/l</u> unless otherwise
SAMPLE ID 7F, Area D	143	12B	108	348	358	388	398	NOTES AND D	H-62	AII

A = benzo(a)anthracene and chrysene co-elute in high concentrations.

* = benzo(b) fluoranthene and benzo(k) fluoranthene co-elute.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

= anthracene and phenanthrene co-elute in high concentrations.

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Analytical Serv Results by Sample

/GC-MS	HETECTED BY LAK	RESULT	ON Pane	lene ND	ene ND	ane 18	ide MB	ide MB	nide ND	orm ND	ane MD	ane MD	ane ND	ane ND	ane MD	ene ND	ene MB	ide MB
NAME EPA Method 624/GC-MS Category	BWS VERIFIED 4 COMPOUNDS DETECT	COMPOUND	1,2-dichloropropane	1,3-dichloropropylene	.,3-dichloropropylen	ethylbenzen	methylene chlor	methyl chlor	methyl bromide	bromoform	dichlorobromomethane	trichlorofluoromethan	dichlorodifluoromethan	chlorodibromomethan	tetrachloroethylene	toluen	trichloroethylen	vinyl chloride
er ru	B.			c is-1	trans-1,							tt T	dic					
	ANALYST INSTRUMENT	R EPA	35<	> ღ	230	7 38√	44	4 70 7	460	477	480	497	200	510	200	967	877	880
E3	A INSTI	NPDES SCAN	170	187	187	197 520	227	217	204	> 0	120	300	134	84	240	250	294	316
TION OIB TEST	1/84		Q Q	9	ω	밁	 의	의 의	 위	의 일		W W	 9	 밁	() () ()	2 2 2		
NO NO NO NO NO NO NO NO NO NO NO NO NO N	07/25/84	RESULT				2	2	Z	Z	Z	Z	Z	Z	Z	Z	Z	9	21
FRACTION OIB Date & Time C	DATE INJECTED	COMPOUND	acrolein	acrylonitrile	benzene	on tetrachloride	chlorobenzene	1,2-dichloroethane	1, 1, 1-trichloroethane	1,1-dichloroethane	1,1,2-trichloroethane	1,1,2,2-tetrachloroethane	chloroethane	(chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1,1-dichloroethylene	1,2-trans-dichloroethylene
Cl ea	2CU07093V01	Ö				carbon		"	1, 1, 1	m	1, 1, 5	1,1,2,2-		bis (ch]	2-chloro		1,1-	1,2-trans-
7F. AT	# 200	EPA	2	ž	4 >	≯ 9	?	100	110	130	140	150	160	170	190	237	297	306
SAMPLE ID 7F, Area	DATA FILE	SCAN	ч,	••	339	•	•	44.	•	•		_						220
SAMPI	DA1	NPDES	71	5	ਨੇ	79	>	150	H-6	3	284	237	> 6	4	100	110	167	267

SAMPLE ID 7F, Area D

Analytical Serv REPO Results by Sample

REPORT

LAB # 84-07-093 Continued From Above

FRACTION OIB TEST CODE MS 624
Date & Time Collected 07/17/84

NAME EPA Method 624/6C-MS
Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in $\frac{uq/1}{}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

CORPORATION

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SAMPLE ID 6D

Results by Sample Analytical Serv

REPORT

LAB # 84-07-093

FRACTION O2A TEST CODE M625 A NAME Method 625 Acid Compounds Date % Time Collected 07/17/84 Category

DATA FILE 20007093002 CONC. FACTOR

DATE EXTRACTED 07/19/84
DATE INJECTED 07/24/84

BMB INSTRUMENT

VERIFIED BY LAK COMPOUNDS DETECTED

RESULT	QN	S	N	œ Z	ÖZ	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4, 6-dinitrophenol	pentachlorophenol	phenol	
EPA	58A	59A	60A	64A	65A	
NPDES SCAN	7.4	ų. Ą	4	9A	104	
RESULT	QN	QV	Q	QN	QN	QN
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	31A	34A	57A
NPDES SCAN	11A	ВА	4	2.A	∢ რ	6 A

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

ug/l unless otherwise specified. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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RECEIVED: 07/18/84

LAB # 84-07-093

REPORT

Analytical Serv

Results by Sample

AA RESULT ÿ ŭ 2 9 ğ NAME Method 625 Base/Neutrals COMPOUNDS DETECTED VERIFIED BY N-nitrosodimethylamine N-nitrosodiphenylamine M-nitrosodi-n-propylamine bis(2-ethylhexyl)phthalate butyl benzyl phthalate di-butyl phthalate diethyl phthalate di-n-octyl phthalate Þ dimethyl phthalate benzo(a)pyrene T acenaphthylene benzo(a)anthracene benzo(b)fluoranthene chrysene benzo(k)fluoranthene anthracene Category COMPOUND BMB FRACTION 02A TEST CODE M625 B
Date & Time Collected 07/17/84 ANALYST INSTRUMENT EPA 61B **66B** 62B 63B **67B 68**B 869 8 70B 718 72B 73B 74B 75B 76B 77B 78E NPDES SCAN 1635 13B 41B 43B 42B 26B 15B 29B 24B 25B S 13 29 78 S S 18B 28 38 DATE EXTRACTED 07/19/84
DATE INJECTED 07/24/84 FRACTION 02A RESULT 밀 2 Ŷ 2 문 Ω Z 9 2 g 2 S g Ë 2 Ž Ÿ acenaphthene benzidine 1, 2, 4-trichlorobenzene hexach lorobenzene hexachloroethane bis(2-chloroethyl)ether 2-chloronaphthalene 1, 2-dichlorobenzene 1, 3-dichlorobenzene 1, 4-dichlorobenzene 3, 3'dichlorobenzidine 2, 4-dinitrotoluene 2,6-dinitrotoluene 1,2-diphenylhydrazine fluoranthene 40B 4-chlorophenyl phenyl ether COMPOUND DATA FILE 2CU07093C02 CONC. FACTOR EPA 8 S 5 88 98 12B 188 25B 20B 26B **27B 28B** 358 36B 37B 39B SAMPLE ID 6D NPDES SCAN 2 46B 338 48 36B 1 1B 168 208 218 22B 238 27E 288 298 318 178 H-66

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CORPORATION		07/18/84
N .	PAGE 9	RECEIVED:

LAB # 84-07-093 Continued From Above

Analytical Serv REPORT Results by Sample

NAME Method 625 Base/Neutrals Category	benzo(ghi)perylene MB	fluorene NE	phenanthrene B ND	dibenzo(a,h)anthracene NB	indeno(1,2,3-cd)pyrene NB	pyrene ME					Register, 11/26/84}.
TEST CODE M625 B ected 07/17/84	798	BOB	818	828	808	848				fied.	(Federal Regi
TEST (88	328	448	198	378	458			togram.	se specified	
FRACTION O2A TEST CODE M625 Date & Time Collected 07/17/84	Q	Q	QN	QN	Q	Q	Q	Q	on chromatogram	s otherwise	limit method 625,
FRACT	4-bromophenyl phenyl ether	bis(2-chloroisopropyl)ether	bis(2-chloroethoxy}methane	hexachlorobutadiene	hexachlorocyclopentadiene	isophorone	naphthalene	DEFINITIONS FOR THIS REPORT nzene	SCAN = scan number or retention time a	results reported in <u>ug/l</u> unless	not detected at EPA detection lin
09 O1	418	42B	43B	52B	938 838	24B	55B	D DEFIN	AN = 508		11
SAMPLE 10 60	14B	128	108	348	328	388	398	NOTES AND	ស់ H-67	A11	QN

A=benzo(a)anthracene and chrysene co-elute in high concentrations.

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

= anthracene and phenanthrene co-elute in high concentrations.

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	7-093	ethod 624/GC-M Category	VERIFIED COMPOUNDS DETECT		ropropane	propylene	propylene	ethylbenzene	chloride	chloride	1 bromide	bromoform	momethane	romethane	romethane	momethane
	LAB # 84-07-093	NAME EPA M	BMS COMPOU	COMPOUND	1,2-dichloropropane	cis-1,3-dichloropropylene	trans-1,3-dichloropropylene	ath	methylene	methy1	methy1		dichlorobromomethane	trichlorofluoromethane	dichlorodifluoromethane	chlorodibromomethane
	REPORT ID 1e	FRACTION 02B TEST CODE MS 624 Date & Time Collected 07/17/84	ANALYST INSTRUMENT	SCAN EPA	327	330	3 330	380	44	450	460	477	487	490	200	510
· •	Samp	TESI		NPDES	177	187	187	190	224	214	204) ()	124	300	130	8
	Serv Results by Sample	FRACTION <u>O2B</u> Date & Time Co	07/25/84	RESULT	GN	QN	QN	QN	21	QN	GN	Q	Q	Q	9	Q
	Analytical Se	FRACTI Date &	DATE INJECTED <u>07/25/84</u>	COMPOUND	acrolein	acrylonitrile	benzene	carbon tetrachloride	chlorobenzene	1,2-dichloroethane	1, 1, 1—trichloroethane	1,1-dichloroethane	1,1,2-trichloroethane	1,1,2,2-tetrachloroethane	chloroethane	(chloromethyl) ether
CORPORATION	₹		07093V02	Ü				C 2 T		,	1, 1,	7~1	# · #	1,1,2,2-		bis (ch
)1/18/	5	H 400	EPA	5	è	4 >	79	2	100	>==	130	140	150	160	174
**************************************	PAGE 10 RECEIVED: 07/18/84	SAMPLE 10 60	DATA FILE 4CU07093V02 CONC. FACTOR 1	NPDES SCAN	16	5 <	>e	۸9	77 481	>> ₩ H-(^ ∠ 2√ 68	140	287	237	26	>4

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tetrachloroethylene

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2-chloroethylvinyl ether

190

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237

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798

285

물

chloroform

278

295

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1, 1-dichloroethylene

1,2-trans-dichloroethylene

306

265

297

165

288

316

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tolvene

띭

trichloroethylene

2

vinyl chloride

RESULT

VERIFIED BY LAK COMPOUNDS DETECTED 1

Method 624/GC-MS

RECEIVED: 07/18/84 PAGE 11

SAMPLE ID 60

Analytical Serv

REPURT Results by Sample

LAB # 84-07-093 Continued From Above

NAME EPA Method 624/GC-MS Category

FRACTION O2B TEST CODE MS 624
Date & Time Collected 07/17/84

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in uq/l unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

CORPORATION

Analytical Serv

REPORT Results by Sample

LAB # 84-07-093

NAME Method 625 Acid Compounds Category

VERIFIED BY

COMPOUNDS DETECTED

FRACTION 03A TEST CODE M625 A
Date & Time Collected 07/16/84

BMB INSTRUMENT DATE EXTRACTED 07/25/84 DATE INJECTED 07/31/84 DATA FILE 20007093003 SAMPLE ID 66, BIdg 3001 CONC. FACTOR

RESULT 4-nitrophenol 2, 4-dinitrophenol 2-methyl-4, 6-dinitrophenol pentach lorophenol phenol COMPOUND **60A** EPA SBA 59A 64A 65A RESULT NPDES SCAN 7A SA 44 9.A 104 2 g Ö ĝ 밁 일 2, 4, 6-trichlorophenol 4-chloro-3-methylphenol 2-nitrophenol 2-chlorophenol 2, 4-dichlorophenol 2, 4-dimethylphenol COMPOUND EPA 214 22A 24A 314 344 57A NPDES SCAN 11A BA 4 £. S 40 H-70

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NOTES AND DEFINITIONS FOR THIS REPORT.

ug/l unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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LAB # 84-07-093

FRACTION 03A TEST CODE M625 B NAME Method 625 Base/Neutrals Analytical Serv REPORT Results by Sample SAMPLE ID 66, BIdg 3001 PAGE 13 RECEIVED: 07/18/84 8 Š H-71

Category	SWS VERIFIED BY LAK COMPOUNDS DETECTED 2	COMPOUND	N-nitrosodimethylamine NB	M-nitrosodiphenylamine NB	N-nitrosodi-n-propylamine NB	bis(2-ethylhexyl)phthalate 12	butyl benzyl phthalate NE	di-butyl phthalate NB	di-n-octyl phthalate 12	diethyl phthalate MB	dimethyl phthalate ND	benzo(a)anthracene A ND	benzo(a)pyrene ND	benzo(b)fluoranthene * MB	benzo(k)fluoranthene * ND	chrysene A NB	acenaphthylene NB	anthracene B <u>NB</u>
07/16/84	ANALYST	SCAN EPA	618	62B	638	1644 668	67B	688	1829 69B	70B	718	728	738	748	75B	768	778	788
Collected		NPDES 8	41B	43B	42B	138 1	158	26B	29B	248	258	58	99	78	98	188	28	<u>യ</u> ന
* Time Co	07/25/84	RESULT	QN	Q	Q	ü	üN	g	9	QN	Q	QN	Q	Q	Q	GN	QN	2
Date &	DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1,2,4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1,2-dichlorobenzene	1, 3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2, 4-dinitrotoluene	2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	nyl phenyl ether
	2CU07093C03		18	æ			മ										~	40B 4-chlorophenyl
	FACTOR	SCAN EPA		58	88	86	128	188	208	258	26B	278	288	358	368	378	398	40E
	DA]	VP DES	100	48	46B	338	368	118	168	20B	218	22B	23B	278	28B	ଅଧ	318	17B

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PAGE 14 RECEIVED:	4 ED: 07/18/84	Analytical Serv Resu	Serv Results by Sample	REPORT Samp le		LAB # 84-07-093 Continued From Above
SAMPLE	SAMPLE ID 66, Bldq 3001		ACTION O3A te & Time Co	ACTION O3A TEST CODE M625 te & Time Collected 07/16/84	TEST CODE M625 B ected 07/16/84	NAME Method 625 Base/Neutrals Category
148	41B 4-bro	4-bromophenyl phenyl ether	Q	88	798	benzo(ghi)perylene NB
12B	42B bis(2-	bis(2-chloroisopropyl)ether	Q	328	808	fluorene NB
108	43B bis(2	bis(2-chloroethoxy)methane		448	818	phenanthrene B ND
348	528	hexachlorobutadiene	Q	198	828	dibenzo(a,h)anthracene MB
a 60	53B hexa	hexachlorocyclopentadiene	QN	378	838	indeno(1,2,3-cd)pyrene NB
38 0	548	isapharane	Q	458	848	ON euse
36 0	558	naphthalene	QN			
NOTES 4	AND DEFINITIONS FOR	FOR THIS REPORT nzene	Q			
H-72	SCAN = scan number	der or retention time on	n chromatogram	ogram.		
7	All results repo	reported in uq/1 unless	otherwis	otherwise specified	O	

A=benzo(a)anthracene and chrysene co-elute in high concentrations.

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

B = anthracene and phenanthrene co-elute in high concentrations.

Analytical Serv

CORPORATION

RECEIVED: 07/18/84

REPORT

LAB # 84-07-093

Results by Sample

LAK 밀 RESULT Ž Ž ÿ ű Ž 21 ÿ 2 670 Z Z Ÿ VERIFIED BY COMPOUNDS DETECTED NAME EPA Method 624/GC-MS 1,2-dichloropropane cis-1, 3-dichloropropylene 33V trans-1, 3-dichloropropylene ethylbenzene methylene chloride methyl chloride methyl bromide bromoform dich lorobromomethane trichlorofluoromethane dichlorodifluoromethane chlorodibromomethane tetrach loroethy lene vinyl chloride trichloroethylene Category COMPOUND BMB 4 TEST CODE MS 624 Date & Time Collected 07/16/84 ANALYST INSTRUMENT EPA 320 200 450 386 440 460 470 487 490 200 216 200 248 798 288 NPDES SCAN 127 455 174 224 180 187 195 215 200 3 124 300 73€ 240 288 いるの 310 æ DATE INJECTED 07/25/84 FRACTION 03B RESULT 일 g 2 47 Ÿ 2 Ş ĝ S 2 S 2 9 Ÿ Ÿ 2 acrolein acrylonitrile benzene carbon tetrachloride chlorobenzene 1,2-dichloroethane 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane chloroethane chloroform bis (chloromethyl) ether 1, 1-dichlorosthylene 1,2-trans-dichloroethylene 2-chloroethylvinyl ether COMPOUND DATA FILE 4CU07093V03 SAMPLE ID 66, BIdg 3001 EPA ລີ à \$ \$? 100 117 134 140 150 200 167 174 196 234 297 NPDES SCAN 336 2 2 <u>გ</u> 3 200 2 147 275 284 234 200 711 Š \$ 160 367 H-73

CORPORATION

Analytical Serv Results by Sample

REPORT

LAB # 84-07-093 Continued From Above

NAME EPA Method 624/0C-MS Category

FRACTION 03B TEST CODE MS 624
Date & Time Collected 07/16/84

SAMPLE ID 66, Bldg 3001

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AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

All results reported in $\frac{uq/l}{l}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE PAGE 17 RECEIVED: 07/18/84

DUP 624 DUP 624 DUP 624 01C 02C 03C

LAB # 84-07-112

Analytical Serv REPORT 04/26/85 11:57:49

CORPORATION

RECEIVED: 07/20/84

* Indicates a value less than 5 times the detection limit. CONTACT CONDVER second column confirmation performed on all four ZERTIFIED BY such low values ranges between Services Footnotes and Comments Duplicate of report of OB/O7/84 Austin, Texas 78766 PREPARED Radian Analytical samples on this work order 8501 MoPac Blvd (512) 454-4797 P.O. Вох 9948 Potential error for PHONE ATTEN Note: SAMPLES ATTEN William Little 212-027-21-05 Tinker AFB WORK ID wells, 601 REPORT Radian Austin CLIENT TINKER Fed Ex 3826 TRANS COMPANY P. D. # TAKEN FACILITY

Analytical Serv TEST CODES and NAMES used on this report an interferent present

specific matrix was not within acceptable limits indicating

@ Indicates that spike recovery for this analysis on the

50 and 100%

SAMPLE IDENTIFICATION EA EA **GB** 임임임칭

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	07/20/84
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PAGE	RECEI

Analytical Serv REPORT Results by Sample

GC 501 NAME EPA M	not specified Category
TEST	ollected
FRACTION OIA TEST CODE	Date & Time C
) 6A	
-	

TEST CODE GC 601 NAME EPA Method 601/GC ected not specified Category	ANALYST RGS MCL VERIFIED BY JSG INSTRUMENT b COMPOUNDS DETECTED 9	SCAN COMPOUND RESULT	R Trichloroethene 642	Dibromochloromethane * NB	1, 1, 2-Trichloroethane * NB	cis-1, 3-Dichloropropene * NB	2-Chloroethylvinyl Ether NB	Bromoform NE	1, 1, 2, 2-Tetrachloroethane # NB	7 Tetrachloroethylene # 4.7	Chlorobenzene NB	1,3-Dichlorobenzene NB	1,2-Bichlorobenzene NB	1,4-Bichlorobenzene NE				
FRACTION OIA TEST CODE Date & Time Collected not	B DATE INJECTED 07/25/84	COMPOUND	Chloromethane ND	Bromomethane ND	Vinyl Chloride ND	Chloroethane ND	Methylene Chloride ND	Trichlorofluoromethane 1.2	1,1-Dichloroethene 1.7	1,1-Dichloroethane 1.4	trans-1, 2-Dichloroethene 18.1	Chloroform ND	1,2-Dichloroethane 2.6	1, 1, 1-Trichloroethane 4.2	Carbon Tetrachloride ND	Bromodichloromethane ND	1,2-Dichloropropane 0.3.	trans-1,3-Dichloropropene ND :
SAMPLE ID 6A	DATA FILE CONC. FACTOR	SCAN						н	ru -78	୯	4		ις	4			7	

PAGE 3 RECEIVED: 07/20/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-112 Continued From Above

SAMPLE 1D 6A

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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PAGE 4 RECEIVED: 07/20/84

Analytical Serv Results by Sample

SAMPLE ID 68	FRACTION OZA TEST C Date & Time Collected	S C C C C C C C C C C C C C C C C C C C	GC 601 NAME EPA Method 601/GC specified Category
DATA FILE CONC. FACTOR	B DATE INJECTED <u>07/25/84</u>	ANAL	RGS CO
SCAN	COMPOUND	SCAN	COMPOUND
	Chloromethane ND :	9	Trichloroethene 102
	Bromomethane ND		Dibromochloromethane * ND
	Vingl Chloride ND		1, 1, 2-Trichloroethane * NB
	Chloroethane ND :		cis-1,3-Bichloropropene * NB
	Methylene Chloride 0.9		2-Chloroethylvinyl Ether NB
N H-	Trichlorofluoromethane 2.7		Bromoform ND
80	1,1-Dichloroethene ND		1,1,2,2-Tetrachloroethane # ND
8	1,1-Dichloroethane 1.4	7	Tetrachloroethylene # 1.7
4	trans-1, 2-Dichloroethene 33.2	Φ	Chlorobenzene 1.3
	Chloroform NB (1, 3-Dichlorobenzene NB
**************************************	1,2-Dichloroethane ND	6	1,2-Dichlorobenzene 1.1
5	1, 1, 1-Trichloroethane G.2		1, 4-Dichlorobenzene NB
	Carbon Tetrachloride ND		
	Bromodichloromethane ND		
The state of the s	1,2-Dichloropropane ND		
	trans-1,3-Dichloropropene ND		

RECEIVED: 07/20/84

Results by Sample Analytical Serv

LAB # 84-07-112 Continued From Above

SAMPLE ID 68

FRACTION 02A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>vg/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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LAB # 84-07-112

I Serv Results by Sample

PAGE 6 RECEIVED: 07/20/84

SAMPLE CONC.	SAMPLE ID 60 DATA FILE CONC. FACTOR SCAN	B DAT	FRACT Date	UN <u>03A</u> (Time Coll 07/26/84 RESULT	CT CODE GC 6 CTED NOT SPEC ANALYST INSTRUMENT SCAN	87 ≤87 = 188
		Chlorofluor	Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride		ι ο	Trichloroethene 4.9 Dibromochloromethane * NE 1,1,2-Trichloroethane * NE cis-1,3-Dichloropropene * NE 2-Chloroethylvinyl Ether NE Bromoform NE
н-82	C E 4	1,1-0 1,1-0 trans-1,2-0	1,1-Dichloroethene 1,1-Dichloroethene trans-1,2-Dichloroethene Chloroform	ND S S O	4	1,1,2,2-Tetrachloroethane # NB Tetrachloroethylene # 0.7 Chlorobenzene NB 1,3-Bichlorobenzene NB
		1,1,1-Tr Carbon Bromodi 1,2-Bi trans-1,3-Bi	1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodichloromethane 1, 2-Dichloropropane trans-1, 3-Dichloropropene			1, 4-Bichlorobenzene NB

PAGE 7 RECEIVED: 07/20/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-112 Continued From Above

SAMPLE 1D 6C

FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

	07/20/84
PAGE 8	RECEIVED:

Analytical Serv Results by Sample

91	FRACTION 04A TEST CODE GC 601 NA	TEST CODE	109 35	NAME EPA ME	NAME EPA Method 601/60
	Late & lime Col	lected not	5086151	·	ateaore

TEST CODE GC 601 NAME EPA Method 601/GC ected not specified Category	ANALYST RGS VERIFIED BY JSG INSTRUMENT b COMPOUNDS DETECTED 2	SCAN COMPOUND RESULT	Z Trichloroethene 0.4	Dibromochloromethane * ND	1, 1, 2-Trichloroethane * MB	cis-1,3-Bichloropropene * NB	2-Chloroethylvinyl Ether NB	Bromoform ND	1, 1, 2, 2-Tetrachloroethane # NB	Tetrachloroethylene # ND	Chlorobenzene NB	1, 3-Dichlorobenzene ND	1,2-Dichlorobenzene NB	1, 4-Dichlorobenzene ND				
FRACTION 04A TEST CODE Date & Time Collected not	B DATE INJECTED 07/26/84	COMPOUND	Chloromethane NB :	Bromomethane ND	Vingl Chloride NB	Chloroethane ND	Methylene Chloride NB	Trichlorofluoromethane 2.6	1, 1-Dichloroethene ND	1, 1-Dichloroethane NB	trans-1, 2-Dichloroethene ND	Chloroform NB	1, 2-Dichloroethane ND	1, 1, 1-Trichloroethane ND	Carbon Tetrachloride ND	Bromodichloromethane ND	1,2-Dichloropropane ND	trans-1, 3-Dichloropropene NB (
SAMPLE ID 76	DATA FILE	SCAN	With the control of t				Н-8	~ 	***************************************									

CORPORATION

PAGE 9 RECEIVED: 07/20/84

Analytical Serv Results by Sample

LAB # 84-07-112 Continued From Above

SAMPLE 10 76

FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram.

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FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

DUP 601 DUP 601 DUP 601 01B 02B 03B 04B

RECEIVED: 07/20/84

Analytical Serv REPURT 04/26/85 11:59:17

LAB # 84-07-113

ERTIFIED BY	CONTACT CONDVER					the detection limit.	nges between	
PREPARED Radian Analytical Services BY <u>8501 MoPac Blvd.</u> P.O. Box 9948 Austin, Texas 78766			Duplicate of report of 08/20/84.	Footnotes and Comments		* Indicates a value less than 5 times the detection limit.	Potential error for such low values ranges between	100%.
PREPAR	ATTEN		Dup 1 ic.			* Indi	Potent	50 and 100%
		SAMPLES 3						
Radian Bl. 4 Austin	ATTEN William Little	Tinker Tinker AFB		WURK ID Sediments TAKEN DG	Fed Ex		212-027-21-05	3907
REPORT Radian TO <u>Bl. 4</u> Austin	ATTEN	CLIENT COMPANY FACILITY		MURK ID TAKEN	TRANS	TYPE	P. O. #	INC. #

specific matrix was not within acceptable limits indicating an interferent present.

@ Indicates that spike recovery for this analysis on the

Digestion Method Digestion Method

ganic Carbon low level

SAMPLE IDENTIFICATION

TSED-20 TSED-23 TSED-28 김영영

on this report	Special Digesti	Special Digesti	Selenium, low l	Total Organic C	Zinc, ICPES											
	PREP W	PREP X	SE GA	TOC	ZN E		1		i	ł	i	ì		ì	į	
Analytical Serv TEST CODES and NAMES used	4		W	TOTA		Ш	F IC Fluoride, IC	HIRCRA RCRA Herbicides	HG CA Mercury, Cold Vapor	MW E Manganese, ICPES	ш	NO3 IC Mitrate, IC	PIRCRA RCRA Pasticides	Lead	PCB SS PCBs in Soil	PHEW A Total Phenolics

Analytical Serv REPORT RESULTS BY TEST

CORPORATION

ECEIVED: 07/20/84

Sample 03 entered units) Sample 02 (entered units) 0.035.9 0.035.9 0.035.9 0.035.9 0.035.9 0.035.9

PAGE 3 RECEIVED: 07/20/84	A STATE	tical Serv REPORT RESULTS BY TEST	REPORT	LAB # 84-07-113 CONTINUED FROM ABOVE
4	10 >	5	10 %	
	7.30	7.30	6.37	
	07/31/84	07/31/84	07/31/84	
	07/31/84	07/31/84	07/31/84	
W W	< 005	<.002	<.002	
10C :	1.30	6/6n	6 65 0	
30 / L	k m	× 06	X 00	
. Iw	6/50	គ្ / ចិក	5/5n	

RECEIVED: 07/20/84

SAMPLE 1D TSED-20

Analytical Serv

Serv Results by Sample

LAB # 84-07-113

FRACTION OIB TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category

DATE INJECTED 08/18/84 ANALYST MSF

VERIFIED BY LLN

CONCENTRATION FACTOR 10

OTHER HERBICIDES

DET. LIMIT

RESULT

COMPOUND

2, 4-D

S 물

RESULT

2,4,5-TP (Silvex)

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 1D TSED-20

FRACTION OIB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category

DATE INJECTED 08/16/84 ANALYST MSF

VERIFIED BY LLN

DET. LIMIT

RESULT

COMPOUND

CONCENTRATION FACTOR 10

OTHER PESTICIDES

DET. LIMIT

2 0

2

Endrin

Methoxychlor

ÿ

Lindane

S ĝ

2 Toxaphene

200

NOTES AND DEFINITIONS FOR THIS REPORT.

Continued From Above VERIFIED BY LLN VERIFIED BY LLN DET. LIMIT DET. LIMIT FRACTION OIB TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified

Category FRACTION O2B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category FRACTION 02B TEST CODE HIRCRA NAME RCRA Herbicides LAB # 84-07-113 Category Category Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified Date & Time Collected not specified OTHER HERBICIDES DATE INJECTED 08/18/84 ANALYST SF DATE INJECTED 08/16/84 ANALYST MSF OTHER PESTICIDES NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. ND = not detected at the specified detection limit. Results by Sample DET. LIMIT DET. LIMIT Analutical Serv 0 (i) ن ت 20 S 9 g ĝ Ş RESULT RESULT CONCENTRATION FACTOR 10 CONCENTRATION FACTOR 10 COMPOUND 2,4-0 2,4,5-TP (Silvex) COMPOUND Lindane Endrin Methoxychlor RECEIVED: 07/20/84 SAMPLE ID 1SED-20 SAMPLE 10 TSED-23 SAMPLE 10 1SED-23 H-91

CORPORATION

RECEIVED: 07/20/84

REPORT Results by Sample Analytical Serv

Continued From Above LAB # 84-07-113

SAMPLE 10 1SED-23

FRACTION 02B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified

Category

Toxaphene

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 10 TSED-28

FRACTION O3B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category

VERIFIED BY LLN

CONCENTRATION FACTOR 10

DATE INJECTED <u>08/16/84</u> ANALYST <u>MSF</u>

OTHER HERBICIDES

RESULT

DET. LIMIT

2, 4, 5-TP (Silvex)

10

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2, 4-D

DET. LIMIT

RESULT

COMPOUND

H - 92

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NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit.

SAMPLE 10 TSED-28

FRACTION 03B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified

> DATE EXTRACTED 08/13/84 CONCENTRATION FACTOR

DATE INJECTED 08/16/84 AMALYST MSF

VERIFIED BY LLN

Category

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1.73 1.73 1.73	REPORT	bu Sample
	Serv	Results

LAB # 84-07-113 Continued From Above

ID TSED-28		FRACTION 03B Date & Time Co	FRACTION 03B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category	NAME RCRA	Pesticides Category
COMPOUND	RESULT	DET. LIMIT	OTHER PESTICIDES	RESULT	DET. LIMI.
Lindane	QN	2.0			
Endrin	ON O	2.0			
Methoxychlor	QN	20.			
Toxaphene	Q	20.			

ND = not detected at the specified detection limit. All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT.

RECEIVED: 07/23/84

LAB # 84-07-131

Serv REPORT 04/26/85 12:00:28 Analytical Serv

* Indicates a value less than 5 times the detection limit. CONTACT CONDVER CERTIFIED BY Potential error for such low values ranges between PREPARED Radian Analytical Services Footnotes and Comments Duplicate of report of OB/17/84 Austin, Texas 78766 8501 MoPac Blvd (512) 454-4797 Box 9948 50 and 100% ATTEN SAMPLES 7/18/84, Nancy Stein WORK ID USAF, Well Water federal express ATTEN William Little 212-027-21-05 COMPANY Tinker AFB REPORT Radian Austin CLIENT TINKER B1. 4 TAKEN TRANS TYPE FACILITY а С INC.

specific matrix was not within acceptable limits indicating @ Indicates that spike recovery for this analysis on the <u>an interferent present</u>

SAMPLE IDENTIFICATION **6B 6A** 의임임의

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Analytical Serv TEST CODES and NAMES used on this report M625 A Method 625 Acid Compounds M625 B Method 625 Base/Neutrals MS 624 EPA Method 624/GC-MS

RECEIVED: 07/23/84

SAMPLE ID 6A

REPORT Analytical Serv

LAB # 84-07-131

Results by Sample

NAME Method 625 Acid Compounds FRACTION OIA TEST CODE M625 A
Date & Time Collected 07/18/84

Category

SWS COMPOUNDS DETECTED BY LAK	COMPOUND	4-nitrophenol NB	2, 4-dinitrophenol NB	2-methyl-4, 6-dinitrophenol NB	pentachlorophenol NB	phenol NB	
ANAL YST TRUMENT	EPA	SBA	SAA	60A	64A	65A	
ANALYST INSTRUMENT	NPDES SCAN	7A	S. A.	44	9.A	104	
07/25/84 07/30/84	RESULT	QN	QN	QN	QN	QN	QN QN
DATE EXTRACTED DATE INJECTED	COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2, 4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
27131C01 2		4,9	4-ch1				•
8 2CU	EPA	21A	22A	24A	31A	34A	57A
DATA FILE <u>2CUO7131CO1</u> CONC. FACTOR <u>2</u>	NPDES SCAN	114	€ Ø	₹ 1–96	24	, 4 6	6A

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram. All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84)

CORPORATION RECEIVED: 07/23/84

Analytical Serv

Results by Sample

REPORT

LAB # 84-07-131

ij Ü ÿ Ÿ Ž, ű Ÿ 2 TAX X Z ű ğ 2 RESULT NAME Method 625 Base/Neutrals COMPOUNDS DETECTED VERIFIED BY T Œ N-nitrosodimethylamine N-nitrosodiphenylamine M-nitrosodi-n-propylamine bis(2-ethylhexyl)phthalate butyl benzyl phthalate di-butyl phthalate di-n-octyl phthalate diethyl phthalate dimethyl phthalate benzo(a)pyrene acenaphthylene benzo(a)anthracene benzo(b)fluoranthene benzo(k)fluoranthene anthracene chrysene Category COMPOUND BMS FRACTION OIA TEST CODE M625 B Date & Time Collected 07/18/84 61B 66B 67B 718 72B 73B 748 758 768 7.7B 788 ANALYST INSTRUMENT EPA 62B 63B 889 69B 70B NPDES SCAN 41B 26B 36Z 24B 188 43B 42B 138 15B 25B S **6**E り記 200 300 DATE EXTRACTED 07/25/84
DATE INJECTED 07/30/84 밀 g RESULT Ÿ 밁 9 2 g 2 밀 g 읖 9 밀 엹 2 2 acenaphthene benzidine 1, 2, 4-trichlorobenzene hexachlorobenzene hexachloroethane 1, 2-dichlorobenzene 1, 3-dichlorobenzene 1, 4-dichlorobenzene 3, 3 'dichlorobenzidine 2, 4-dinitrotoluene 1, 2-diphenylhydrazine fluoranthene 40B 4-chlorophenyl phenyl ether bis(2-chloroethyl)ether 2-chloronaphthalene 2,6-dinitrotoluene COMPOUND CONC. FACTOR 2 EPA 378 18 25B **26B** 27B 28B 35B 36B 39E 30 88 12B 188 20B 98 SAMPLE 1D 6A NPDES SCAN 2 318 46B 36B 11B 16B 20B 21B 22B 23B 27B 288 29B 17B 43 338

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REPORT	Results by Sample
Analutical Serv	Results
	07/23/84
PAGE 4	RECEIVED:

LAB # 84-07-131 Continued From Above

SAMPLE 1D 6A	1D 6A		RACTION OIA	IE31	TEST CODE M625 B	NAME Method 625 Base/Neutrals
			Date & Time Collected 07/18/84	llected	07/18/84	Category
148	418	4-bromophenyl phenyl	ether ND	88	198	benzo(ghi)perylene MD
128	42B	bis(2-chloroisopropyl)et	ther ND	32B	BOB	fluorene MB
108	438	bis(2-chloroethoxy)meth	thane ND	44B	818	phenanthrene B NE
348	528	hexachlorobutadi	liene ND	198	828	dibenzo(a,h)anthracene NB
388	938	hexachlorocyclopentadi	liene ND	378	838	indeno(1,2,3-cd)pyrene NB
388	54B	isophor	rone ND	45B	848	<u>an</u> analyd
398	55B	naphthal	lene ND			
NOTES AN	AND DEFIN	DEFINITIONS FOR THIS REPORT , nz	GN enezi			

SCAN = scan number or retention time on chromatogram.

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All results reported in <u>ug/L</u> unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* = benzo(b)*luoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute in high concentrations.

B = anthracene and phenanthrene co-elute in high concentrations.

PAGE 5 RECEIVED: 07/23/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-131

VERIFIED BY LAK DS DETECTED 1	RESULT	opropane ND	ropylene NB	ropylene NB	1benzene MB	chloride NB	chloride MB	bromide ND	romoform ND	omethane MD	omethane ND	omethane ND	iomethane NB	ethylene ND	toluene ND	ethylene 779	Ch lonida Mir
BWS COMPOUNI	COMPOUND	1,2-dichlor	cis-1,3-dichlorop	ans-1,3-dichjorop	ethy	methylene	methyl	methy!	æ	dichlorobrom	trichlorofluor	dichlorodifluor	chlorodibrom	tetrachloro		trichloro	C adio
LYST MENT	EPA	320	756	334 41	380	440	45¢	460	477	48¢	490	200	510	256	967	976	700
ANA INSTRU	SCAN	~>	~	*>	~	>	>	>	>	>	>	>	>	>	>	313	2
pri l	NPDES	17.	18	18	19	55	21.	50	ű 	i	Ö M	13	ō		in N	Ď.	316
07/25/84	RESULT	Q N	Ü	Q	QN	Ö	S	S	Ö	Ü	Ö	N	Q	S	ON	Q	ŭ
DATE INJECTED	COMPOUND	acrolein	acrylonitrile	benzene	irbon tetrachloride	chlorobenzene	1,2-dichloroethane	., 1-trichloroethane	1,1-dichloroethane	., 2-trichloroethane	2-tetrachloroethane	chloroethane	hloromethyl) ether	proethylvingl ether	chloroform	1-dichloroethylene	1. Ottracaldirbloroetts: lese
07131701					ü					hw)	1,1,2,0		bis (c	2-ch16		, i	1, 2-tran
	EPA	> N	> e	4	>9	?	100	110	13<	140	150	160	174	190	237	290	200
FIL	AN																
	4CUO7131VO1 DATE INJECTED 07/25/84 ANALYST BWS COMPOUNDS DETECTED 1 COMPOUNDS DETECTED	4CU07131V01DATE INJECTED 07/25/84ANALYSTBWSVERIFIED BY11f4COMPOUNDS DETECTEDEPACOMPOUNDRESULT NPDES SCAN EPACOMPOUND	4CUO7131VO1 DATE INJECTED G7/25/84 ANALYST BWS VERIFIED BY L 1	4CUO7131VO1DATE INJECTEDG7/25/84ANALYSTBWSVERIFIED BY LEPACOMPOUNDSRESULTNPDESSCANEPACOMPOUNDRESULT2VacroleinND17V32V1,2-dichloropropane3VacrylonitrileND18V33Vcis-1,3-dichloropropylene	4CUO7131VO1DATE INJECTEDG7/25/84ANALYSTBMSVERIFIED BY LEPACOMPOUNDRESULTNPDESSCANEPACOMPOUNDRESU2VacroleinND17V32V1,2-dichloropropylene3VacrylonitrileND18V33Vcis-1,3-dichloropropylene4VbenzeneND18V33Vtrans-1,3-dichloropropylene	4CUO7131VO1 DATE INJECTED Q7/25/84 ANALYST BMS COMPOUNDS VERIFIED BY L EPA COMPOUND RESULT NPDES SCAN EPA COMPOUND RESUL 2V acrolein ND 17V 32V 1,2-dichloropropane 3V acrylonitrile ND 18V 33V cis-1,3-dichloropropylene 4V benzene ND 18V 33V trans-1,3-dichloropropylene 6V carbon tetrachloride ND 19V 38V ethylbenzene	4CUO7131VO1 DATE INJECTED 07/25/84 INSTRUMENT EMS COMPOUNDS DETECTED BY EPA COMPOUNDS DETECTED RESULT NPDES SCAN EPA COMPOUNDS DETECTED RESULT 2V acrylonitrile ND 17V 32V 1,2-dichloropropylene RESULT 4V benzene ND 18V 33V trans-1,3-dichloropropylene	4CUO7131VO1 DATE INJECTED G7/25/84 ANMALYST ANMALYST BMS COMPOUNDS DETECTED EPA COMPOUND RESULT NPDES SCAN EPA COMPOUND RESU 2V acrylonitrile ND 17V 32V 1,2-dichloropropropylene RESU 3V acrylonitrile ND 18V 33V trans-1,3-dichloropropylene Ethylbenzene 6V carbon tetrachloride ND 19V 38V acthylbenzene Ethylbenzene 7V chlorobenzene ND 22V 44V methyllene chloride 10V 1,2-dichloroethane ND 21V 45V methyllene chloride	4CUO7131VO1 DATE INJECTED Q7/25/84 ANALYST ANALYST BMS COMPOUNDS DETECTED EPA COMPOUNDS DETECTED RESULT NPDES SCAN EPA COMPOUNDS DETECTED 2V acrolein ND 17V 32V 1,2-dichloropropane 3V benzene ND 18V 33V trans-1,3-dichloropropylene 4V chlorobenzene ND 19V 33V trans-1,3-dichloropropylene 7V chlorobenzene ND 22V 44V methylene chloride 10V 1,1-trichloroethane ND 22V 45V methylene chloride 11V 1,1-trichloroethane ND 20V 45V methylene chloride	4CUO7131VO1 DATE INJECTED 07/25/84 ANALYST EBAS COMPOUNDS DETECTED EPA COMPOUND RESULT NPDES SCAN EPA COMPOUNDS DETECTED 2V acrolein ND 17V 32V 1,2-dichloropropylene 3V benzen ND 18V 33V cis-1,3-dichloropropylene 4V benzen ND 18V 33V cis-1,3-dichloropropylene 5V carbon tetrachloride ND 19V 33V cis-1,3-dichloropropylene 7V chlorobenzene ND 19V 38V ethylbenzene 10V 1,1-dichloroethane ND 22V 44V methyllene chloride 11V 1,1,1-dichloroethane ND 20V 45V methyll bromide 13V 1,1-dichloroethane ND 5V 45V methyll bromide	4CUO7131VO1 DATE INJECTED Q7/25/84 ANALYST BMS COMPOUNDS DETECTED EPA COMPOUND RESULT NPDES SCAN EPA COMPOUNDS DETECTED 2V acrylonitrile ND 17V 32V 1,2-dichloropropylene 3V benzene ND 18V 33V cis-1,3-dichloropropylene 4V carbon tetrachloride ND 19V 33V trans-1,3-dichloropropylene 5V carbon tetrachloride ND 19V 38V ethylbenzene 10V 1,2-dichloroethane ND 22V 44V methyllene chloride 11V 1,1,1-dichloroethane ND 20V 46V methyll bromide 13V 1,1,2-trichloroethane ND 5V 45V methyllorobromomethane	4CUO7131VO1 DATE INJECTED G7/25/84 ANALYST BMS COMPOUNDS DETECTED EPA COMPOUNDS DETECTED RESULT NPDES SCAN EPA COMPOUNDS DETECTED 2V acrylonitrile ND 17V 32V 1,2-dichloropropylene 3V carbon tetrachloride ND 18V 33V trans-1,3-dichloropropylene 6V carbon tetrachloride ND 19V 38V ethylbenzene 7V chlorobenzene ND 22V 44V methylene chloride 10V 1,1-dichloroethane ND 22V 44V methylene chloride 11V 1,1-dichloroethane ND 20V 45V methylene chloropromethane 14V 1,1,2-trichloroethane ND 12V 45V bromoform 15V 1,1,2-ctetrachloroethane ND 38V dichlorophromomethane	COMPOUND Date INJECTED G7/25/84 ANALYST BMS COMPOUNDS DETECTED PA	4CUOTISIVOI DATE INJECTED Q7/25/84 ANALYST BMS VCRIFIED BY LEGTED EPA CDMPDUND RESULT NPDES SCAN FPA CDMPDUNDS DETECTED 2V acrolein ND 17V 32V 1,2-dichloropropale 3V acrylonitrile ND 18V 33V trans-1,3-dichloropropylene 4V carbon tetrachloride ND 19V 33V trans-1,3-dichloropropylene 5V carbon tetrachloride ND 19V 33V trans-1,3-dichloropropylene 6V carbon tetrachloride ND 19V 34V acthylbenzene 7V chlorobenzene ND 22V 44V methylbenzene 11V 1,1,1-trichloroethane ND 2V 45V methylbromoethane 15V 1,1,2,2-tetrachloroethane ND 30V 49V trichlorophromoethane 15V 1,1,2,2-tetrachloroethane ND 36V 49V trichlorodifiluoromethane 16V 1,1,2,2-tetrachloroethane	EPA COMPDUND RESULT NPDES SCAN EPA COMPDUND RESULT 2V acrolein ND 17V 32V 1,2-dichloropropylene BESULT 3V acrylonitrile ND 17V 32V 1,2-dichloropropylene BESULT 4V benzene ND 18V 33V trans-1,3-dichloropropylene BEHAJLBenzene 5V carbon tetrachloride ND 19V 33V trans-1,3-dichloropropylene BEHAJLBenzene 10V 1,2-dichloropenzene ND 19V 38V acthylbenzene BEHAJLBenzene 11V 1,1-trichloroethane ND 2V 44V methyllene chloride 13V 1,1,2-trichloroethane ND 2V 45V Archioropiluoropiluoromethane 15V 1,1,2-trichloroethane ND 3V 47V Archioropiluoropiluoromethane 15V 1,1,2,2-tetrachloroethane ND 3V 47V Arcichloropiluoromethane 16V 1,1,2,2-tetrachloroethane ND	COMPOUND RESULT NPDES SCAN EPA COMPOUND RESULT 2V acrylonitrile ND 17V 32V 1,2-dichloroprophlene 1 3V acrylonitrile ND 17V 32V 1,2-dichloropropylene 1 4V benzene ND 18V 33V trans-1,3-dichloropropylene 1 5V carbon tetrachloride ND 18V 33V trans-1,3-dichloropropylene 1 7V carbon tetrachloride ND 19V 38V ethylbenzene 1 1V 1,2-dichloroethane ND 22V 44V methylene chloride 1 11V 1,1-dichloroethane ND 2V 46V methylene chloride 1 15V 1,1,2-trichloroethane ND 3V 47V methylenomethane 1 16V 1,1,2-trichloroethane ND 3V 47V trichlorodifloromethane 1 16V bis (chloromethyl) ether ND 3V <	COMPOUND RESULT NDES SCAN FPA COMPOUNDS DETECTED RESULT ANALYST BMS COMPOUNDS DETECTED RESULT NDES SCAN FPA COMPOUNDS DETECTED RESULT NDES SCAN FPA COMPOUNDS DETECTED RESULT NDES SCAN FPA COMPOUNDS DETECTED RESULT NDES SCAN T, 2-dichloroptropalene RESULT NDE 17V 32V Trans-1, 3-dichloroptropalene REMAIL 6 RECEIVED: 07/23/84

SAMPLE ID 6A

Serv REPORT Results by Sample Analytical Serv

Continued From Above LAB # 84-07-131

NAME EPA Method 624/GC-MS
Category

FRACTION OIB TEST CODE MS 624
Date & Time Collected 07/18/84

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79). All results reported in <u>ug/L</u> unless otherwise specified.

Analytical Serv

CORPORATION

REPORT Results by Sample

LAB # 84-07-131

RECEIVED: 07/23/84

SAMPLE ID 68

NAME Method 625 Acid Compounds FRACTION OZA TEST CODE M625 A
Date & Time Collected 07/18/84

Category

BMS DATA FILE <u>2CU07131C02</u> CDNC. FACTOR

COMPOUNDS DETECTED VERIFIED BY INSTRUMENT DATE EXTRACTED 07/25/84
DATE INJECTED 07/30/84

RESULT	Q	ÜN	Q.	N	ON O	
COMPOUND	4-nitrophenol	2,4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
EPA	58A	φ Φ	60A	64A	65A	
RESULT NPDES SCAN	7A	SA	44	94 4	10A	~ ~~
RESULT	QN	gN	QN	GN	QN	Q
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2, 4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	344	57A
NPDES SCAN	114	ВА	₹ H-1:	8	34	64

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

ug/L unless otherwise specified. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

Analytical Serv Results by Sample

LAB # 84-07-131

NAME Method 625 Base/Neutrals Category	BWS VERIFIED BY LAK COMPOUNDS DETECTED O	COMPOUND	N-nitrosodimethylamine NB	N-nitrosodiphenylamine NB	M-nitrosodi-n-propylamine MB	is(2-ethylhexyl)phthalate ND	butyl benzyl phthalate NB	di-butyl phthalate NB	di-n-octyl phthalateND	diethyl phthalate NB	dimethyl phthalate ND	benzo(a)anthracene A NB	benzo(a)pyrene NB	benzo(b)fluoranthene * NB	benzo(k)fluoranthene * <u>MB</u>	chrysene A <u>MB</u>	acenaphthylene <u>NE</u>	anthracene B ND
ACTION O2A TEST CODE M625 B te & Time Collected 07/18/84	ANALYSTINSTRUMENT	SCAN EPA	618	62B	859	66B b	678	889	849	768	718	728	738	748	758	768	778	788
TES.	البدانيد	NPDES	418	438	428	138	158	26B	298	248	258	8	89	78	日台	188	ea CV	<u>a</u> ()
ACTION OZA te & Time Co	07/25/84 07/30/84	RESULT	GN	QN	GN	QN	QN	Q	QN	QN	GN	Q	QN	QN	QN	QN	QN	ND
FRACTI Date &	DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1,2,4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl}ether	2-chloronaphthalene	1, 2-dichlorobenzene	1, 3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2,4-dinitrotoluene	2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	henyl phenyl ether
	2CU07131C02				1,2,			bis(2	Ń		***	***	e 6			ė,		4-chlorophenyl
20 EE		EPA	13	ខា	88	98	128	188	20B	25B	26B	27B	288	358	368	37B	398	40B 4
SAMPLE 1D 68	DATA FILE CONC. FACTOR	NPBES SCAN	13	48	468	338	368	118	83 9 H-10	20B	218	22B	238	27B	288	29B	318	178

CORPORATION Analytical Serv

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Analytical Serv Results by Sample

LAB # 84-07-131 Continued From Above

SAMPL	SAMPLE ID 68	FRACTI	RACTION OZA	RACTION OZA TEST CODE M625 B	E M625 B	NAME Method 625 Base/Neutrals Category	w
	24		- 432	ä	798	404	2
r T		Through throughout or t		3	3		
128	42B	bis(2-chloroisopropyl)ether	GN CO	328	808	fluorene M	밀
108	438	bis(2-chloroethoxy)methane	QN	448	818	phenanthrene B NI	2
348	52B	hexachlorobutadiene	GN	198	82B	dibenzo(a,h)anthracene M	2
850	53B	hexachlorocyclopentadiene		37B	838	indeno(1,2,3-cd)pyrene M	2
388	548	isophorone	QN	45B	848	pyrene N	Ÿ
398	300 300 300 300 300 300 300 300 300 300	naphthalene	QN				
NOTES	AND	DEFINITIONS FOR THIS REPORT, nzene	QN				
-103		SCAN == scan number or retention time (on chromatogram	togram.			

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

All results reported in <u>ug/L</u> unless otherwise specified.

A = benzo(a)anthracene and chrysene co-elute in high concentrations.

B = anthracene and phenanthrene co-elute in high concentrations.

CORPORATION Analytical Serv

RECEIVED: 07/23/84

lytical Serv Results by Sample

LAB # 84-07-131

LAK N ÿ Ž 134 ij ů, ü 9 ğ Ÿ Ž ဌ Ž ÿ ŭ ÿ Ĭ RESULT COMPOUNDS DETECTED NAME EPA Method 624/GC-MS VERIFIED bromoform ethylbenzene methyl chloride methyl bromide chlorodibromomethane tetrach loroethy lene trichloroethylene vinyl chloride 1, 2-dichloropropane cis-1, 3-dichloropropylene 33V trans-1, 3-dichloropropylene methylene chloride dichlorobromomethane trich lorofluoromethane dichlorodifluoromethane Category COMPOUND BMB 4 FRACTION O2B TEST CODE MS 624
Date & Time Collected 07/18/84 236 200 216 200 320 384 440 460 470 48V 497 798 ンドの 288 ANAL YST INSTRUMENT 450 NPDES SCAN 316 170 134 3 240 ンかい 316 184 184 792 224 215 200 **%** 13 300 ンので DATE INJECTED 07/25/84 呈 48 RESULT ğ 2 S Ñ S 2 2 g Ö ĝ 2 옃 Ñ 2 acrolein acrylonitrile benzene carbon tetrachloride chlorobenzene 1, 2-dichloroethane 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane ch loroethane bis (chloromethyl) ether 2-chloroethylvinyl ether chloroform 1, 1-dichloroethylene 1,2-trans-dichloroethylene COMPOUND DATA FILE 4CU07131V02 300 200 114 150 177 \$ 29 100 134 140 167 190 234 295 ₹ SAMPLE 1D 6B 214 NPDES SCAN 267 2 ລີ š 3 ? 150 275 146 284 234 **>** 3 305 115 167 H-104

SAMPLE ID 60

Serv Results by Sample Analytical Serv

FRACTION O3A TEST CODE M625 A
Date & Time Collected 07/18/84

Category

NAME Method 625 Acid Compounds

LAB # 84-07-131

VERIFIED BY LAK COMPOUNDS DETECTED BMB ANAL YST INSTRUMENT DATE EXTRACTED 07/25/84 DATE INJECTED 07/30/84 DATA FILE <u>2CU07131C03</u> CDNC. FACTOR

RESULT	Q.	QV	QN	Q	Q	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4, 6-dinitrophenol	pentachlorophenol	phenol	
EPA	SBA	59A	60A	64A	65A	
NPDES SCAM	7.A	ψ in	44	94 4	10A	
RESULT	Q	QN	QN	QN	QN N	ON
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2, 4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	31A	344	57A
NPDES SCAN	11A	8A	₩-	ຊ ດີ -106	9.A	6 A

AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

ug/L unless otherwise specified. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

LAB # 84-07-131

Analytical Serv REPURT Results by Sample

RECEIVED: 07/23/84

SAMPLE 1D 6C

FRACTION 03A TEST CODE M625 A NAME Method 625 Acid Compounds Date & Time Collected 07/18/84 Category

VERIFIED BY <u>LAK</u> DS DETECTED <u>O</u>	RESULT	no 1 ND	nol NB	nol ND	no l	phenol <u>MB</u>	
VERIFIED BY COMPOUNDS DETECTED	COMPOUND	4-nitrophenol	2,4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	ahq	
BMS				2-methy]			
ANAL YST TRUMENT	EPA	SBA	59A	60A	64A	65A	
ANAL YST INSTRUMENT	SCAM						
~	NPDES SCAM	7.A	ą A	44 4	9A	10A	
<u>07/25/84</u> 07/30/84	RESULT	QN	9	위	Q		Q
TED			~				
DATE EXTRACT DATE INJECT	OMPOUND	6-trichlorophenol	oro-3-methylphenol	2-chlorophenol	2, 4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
DATE EXTRAC DATE INJEC	COMPOUND	2,4,6-trichloropheno	4-chloro-3-methylpheno	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	Z-nitrophenol
2CUO7131CO3 DATE EXTRAC	EPA COMPOUND	21A 2, 4, 6-trichloropheno	22A 4-chloro-3-methylpheno	24A 2-chlorophenol	31A 2,4-dichlorophenol	34A 2,4-dimethylphenol	57A 2-nitrophenol
CO3 DATE EXTRAC DATE INJEC		2,4,6-trichlorophe	4-chloro-3-methylphe	2-chloroph			`

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified. ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

CORPORATION RECEIVED: 07/23/84

Analytical Serv

Results by Sample

LAB # 84-07-131

Ÿ 밀 N U Ÿ 밀 ÿ 2 ŭ ÿ 2 밀 LAK 9 ü RESULT NAME Method 625 Base/Neutrals COMPOUNDS DETECTED VERIFIED BY Þ di-n-octyl phthalate diethyl phthalate ⋖ benzo(a)pyrene acenaphthylene N-nitrosodimethylamine bis(2-ethylhexyl)phthalate butyl benzyl phthalate di-butyl phthalate dimethyl phthalate N-nitrosodiphenylamine N-nitrosodi-n-propylamine benzo(a)anthracene anthracene benzo(b) fluoranthene benzo(k) fluoranthene chrysene Category COMPOUND BMB TEST CODE M625 B Date & Time Collected 07/18/84 788 ANALYST INSTRUMENT EPA 61B 62B 63B 66B **67B 68B** 869 70B 718 72B 738 74B 75B 768 778 NPDES SCAN 1840 298 41B 26B 24B (1) (1) **6**B 188 2B 38 43B 42B 13B 15B 258 78 DATE EXTRACTED 07/25/84 DATE INJECTED 07/30/84 FRACTION 03A 9 RESULT 2 S Ÿ Ÿ 2 S 皇 S Ÿ g 2 S 읖 물 엹 acenaphthene benzidine 1, 2, 4-trichlorobenzene hexachlorobenzene hexachloroethane 2-chloronaphthalene 1, 2-dichlorobenzene 1,3-dichlorobenzene 1, 4-dichlorobenzene 3,3'dichlorobenzidine 2, 4-dinitrotoluene 1, 2-diphenylhydrazine fluoranthene 40B 4-chlorophenyl phenyl ether 2,6-dinitrotoluene bis(2-chloroethyl)ether COMPOUND DATA FILE <u>2CU07131C03</u> EPA 13 5B 88 98 25B 26B 27B 28B 36B 378 39B 12B 188 20B 35B SAMPLE 1D 6C NPDES SCAN 46B 338 368 113 168 208 218 22B 238 27B 28B 29B 318 17B 48 H-107

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Analytical Serv REPORT Results by Sample

LAB # 84-07-131 Continued From Above

SAMPLE ID 60	39 01	B	ACTION O3A TEST CODE M625 ate & Time Collected O7/18/84	TEST	TEST CODE M625 B ected 07/18/84	NAME Method 625 Base/Neutrals Category
148	418	4-bromophenyl phenyl e	ther ND	88	79B	benzo(ghi)perylene NB
128	42B	42B bis(2-chloroisopropyl)et	her ND	328	808	fluorene NB
108	438	bis(2-chloroethoxy)meth	ane ND	448	818	phenanthrene B ND
348	52B	hexachlorobutadi	ene ND	198	828	dibenzo(a, h)anthracene MB
338	885 83B	hexachlorocyclopentadi	ene ND	378	838	indeno(1,2,3-cd)pyrene NB
388	54B	isophor	one ND	458	848	Dh. eusahd
398	8 9 9	naph tha l	ene ND			
NOTES /	AND DEFINI	DEFINITIONS FOR THIS REPORT. N.	ene ND			

SCAN = scan number or retention time on chromatogram.

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All results reported in <u>ug/L</u> unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

A=benzo(a)anthracene and chrysene co-elute in high concentrations.

= anthracene and phenanthrene co-elute in high concentrations. œ

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Analytical Serv

REPORT Results by Sample

LAB # 84-07-131

ű ŭ 2 ÿ 2 ÿ ű ğ ŭ ğ ÿ ŭ ŽĮ. ÿ ÿ T A X RESULT COMPOUNDS DETECTED VERIFIED BY NAME EPA Method 624/GC-MS vinyl chloride bromoform chlorodibromomethane tolvene methyl chloride methyl bromide trichlorofluoromethane dichlorodifluoromethane tetrach loroethylene trichloroethylene 1, 2-dichloropropane 33V trans-1, 3-dichloropropylene ethylbenzene methylene chloride dichlorobromomethane cis-1, 3-dichloropropylene Category COMPOUND BMB 44 TEST CODE MS 624 Date & Time Collected 07/18/84 ANALYST INSTRUMENT 200 210 >のの スタ田 278 200 EPA 200 440 450 460 470 48V 497 200 380 NPDES SCAN さるで 310 214 ă 247 さらい 170 187 180 190 224 205 <u>ک</u> 2 300 134 DATE INJECTED 07/25/84 FRACTION 03B Ÿ RESULT Ÿ S 呈 g 2 ÿ Ÿ 9 ü Ÿ S Ž ĝ Ÿ 9 acrolein chloroform 1, 2-trans-dichloroethylene acrylonitrile benzene carbon tetrachloride chlorobenzene 1, 2-dichloroethane 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane chloroethane 1,1-dichloroethylene bis (chloromethyl) ether 2-chloroethylvinyl ether COMPOUND DATA FILE 4CU07131V03 306 EPA 114 2 à \$ **%** ? 3 0 1 0 1 134 14∨ 150 167 174 190 234 297 SAMPLE 1D 6C NPDES SCAN 2 à 3 2 150 275 45 284 237 ⋛ \$ 100 717 160 ンタの ત્ર

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Analytical Serv REPURT Results by Sample

LAB # 84-07-131 Continued From Above

NAME EPA Method 624/6C-MS

Category

SAMPLE 10 6C

FRACTION 03B TEST CODE MS 624
Date & Time Collected 07/18/84

AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

Analytical Serv

Serv REPORT Results by Sample

LAB # 84-07-131

RECEIVED: 07/23/84

SAMPLE 10 76

FRACTION 04A TEST CODE M625 A
Date & Time Collected 07/18/84

NAME Method 625 Acid Compounds Category

BY LAK	RESULT	N	Ö	N	N	QN	
WERIFIED BY COMPOUNDS DETECTED	COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	p Heno1	
ANALYST INSTRUMENT	EPA	58A	59A	60A	64A	65A	
AA INSTR	NPDES SCAN	7.4	ĄŖ	44	94	10A	
<u>07/25/84</u> 07/30/84	RESULT N	QN	Q	Q	Q	Q	Q
DATE EXTRACTED DATE INJECTED	COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
07131C04 2	J	2,4,	4-ch1		(0	(u	
700 H	EPA	214	22A	24A	314	34A	57A
DATA FILE <u>2CU07131CO4</u> CONC. FACTOR <u> </u>	NPBES SCAN	114	84	¥. H	₹ ∾ -111	∀ e	6 A

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in ug/L. unless otherwise specified. SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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Analytical Serv Results by Sample

LAB # 84-07-131

utrals	BY LAK	RESULT	N	ND	Q.	ND	ON	ND	ON	ND	ND	MD	ON	ON D	ND	MD	MD	ÜN
NAME Method 625 Base/Neutrals Category	BWS COMPOUNDS DETECTED	COMPOUND	N-nitrosodimethylamine	N-nitrosodiphenylamine	N-nitrosodi-n-propylamine	bis(2-ethylhexyl)phthalate	butyl benzyl phthalate	di-butyl phthalate	di-n-octyl phthalate	diethyl phthalate	dimethyl phthalate	benzo(a)anthracene A	benzo(a)pyrene	benzo(b)fluoranthene *	benzo(k)fluoranthene *	chrysene A	acenaphthy]ene	anthracene B
ODE M625 B	ANALYST TRUMENT	EPA	618	62B	638	66B b	678	889	869	70B	718	728	73B	748	758	768	778	788
Collected O7/	ANAL.YST INSTRUMENT	NPDES SCAN	41B	43B	42B	138	158	268	29B	248	258	88.0	5 B	78	0 7	188	28	8 8
N O4A Time Col	07/25/84 07/30/84	RESULT N	9	9	일	9	9	<u> </u>	ĝ	9 2	9	9	GN -	9 	<u>9</u>	 <u>S</u>	GN	GN GN
	olol	GF.	l	ı														
FRACTION 04A Date & Time C	DATE EXTRACTED <u>O</u> DATE INJECTED <u>O</u>		acenaphthene	benzidine	4-trichlorobenzene	hexachlorobenzene	hexachloroethane	-chloroethyl)ether	-chloronaphthalene	,2-dichlorobenzene	,3-dichlorobenzene	, 4-dichlorobenzene	'dichlorobenzidine	2, 4-dinitrotoluene	2,6-dinitrotoluene	-diphenylhydrazine	fluoranthene	henyl phenyl ether
FRACTION Date &	DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	Ö	1, 2, 4-trichlorobenzene	N	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1, 2-dichlorobenzene	1, 3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2, 4-dinitrotoluene	2,6-dinitratoluene	1,2-diphenylhydrazine	fluoranthene	phenyl e
SAMPLE ID 76 PRACTION Date &	CO4 DATE EXTRACTED DATE INJECTED		1B acenaphthene	Ö	M	N	12B hexachloroethane	18B bis(2-chloroethyl)ether		H	N	H	B			7-4	39B fluoranthene	d)

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	B 00	CORPORATION				
PAGE 19 RECEIVED: 07/23/84	07/23	/84	Analytical Serv Results by Sample	REPORT y Sample	<u></u>	LAB # 84-07-131 Continued From Above
SAMPLE ID 76			FRACTION 04A TEST CODE M625 Date & Time Collected 07/18/84	TEST (TEST CODE M625 B ected 07/18/84	NAME Method 625 Base/Neutrals Category
148	418	4-bromophenyl	pheny1	88	798	benzo(ghi)perylene ND
128	42B	bis(2-chloroisopropyl)et	opropyllether ND	328	BOB	fluorene NB
108	438		bis(2-chloroethoxy)methane NB	448	818	phenanthrene B <u>ND</u>
348	52B		hexachlorobutadiene ND	198	828	dibenzo(a, h)anthracene NB
300	538	hexachlorocyclopentadi	clopentadiene ND	378	838	indeno(1,2,3-cd)pyrene NB
388	548		isophorone ND	458	848	Dyrene ND
398	558		naphthalene ND			
NOTES AND		DEFINITIONS FOR THIS	REPORT nzene ND			
H-11	11	scan number or re	retention time on chrom	chromatogram.		
3	results	ts reported in_	ug/L unless otherwis	a spec	ified.	**
QN	= not	detected at EPA	detection limit method	625,	(Federal Re	Register, 11/26/84}.
 ★		benzo(b}fluoranthene	: and benzo(k)fluoranthene		co-elute.	
4		benzo(a)anthracene a	and chrysene co-elute	in high a	concentrations	.ទ.ភ.
=		anthracene and phena	phenanthrene co-elute in high		concentrations.	

07/23/84	Analytical Serv Results by Sample	REPURT Sample	LAB # 84-07-131
2	FRACTION 04B	TEST CODE MS 624	NAME EPA Method 624/6C-MS

ic-ms	IFIED BY LAK DETECTED O	RESULT	Ine NB	ine NE	ine NE	ine MD	de MB	de ND	de MB	P. WE	Ine NE	ine NE	ine ME	ine ME	ine MD	ne NB	ine MB	ab.
EPA Method 624/GC-MS Category	VERIFIED COMPOUNDS DETEC	COMPOUND	1,2-dichloropropane	3-dichloropropylen	trans-1,3-dichloropropylene	ethylbenzene	methylene chlorid	methyl chlorid	methyl bromide	bromoform	dichlorobromomethane	trichlorofluoromethane	dichlorodifluoromethan	chlorodibromomethan	e etrachloroethylene	tolvene	trichloroethylen	vinyl chlorid
624 NAME	BMS f4			cis-1,3	trans-1,3						9	tric	dichl	ΰ				
£ 200 €	ANALYST INSTRUMENT	SCAN EPA	320	330	>56 93 94	380	44	450	460	47.V	480	490	200	510	989	A98	877	288
TEST CODE 07/1		NPDES S	170	180	186	761	22A	210	20¢	> 'S	120	A06	130	> 8 	246	250	290	316
FRACTION 04B Date & Time C	07/25/84	RESULT	Q	Q	QN	QN	QN	QN	QN	QN	GN	GN	QN	QN	QN	GN	ON	QN
FRACT	DATE INJECTED	COMPOUND	acrolein	acrylonitrile	penzene	carbon tetrachloride	chlorobenzene	1,2-dichloroethane	1,1,1-trichloroethane	1, 1-dichloroethane	1,1,2-trichloroethane	1,1,2,2-tetrachloroethane	chloroethane	bis (chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1,1-dichloroethylene	1,2-trans-dichloroethylene
	DATA FILE <u>4CUO7131V04</u> C. FACTOR 1	Ü				Cat		,	1, 1,	4 4	1, 1,	1,1,2,2		bis (ch	2-chlor		## ·	1,2-trans
2	ILE 4CU	N EPA	24	ž	4	^9	2	100	110	130	14∨	150	167	176	194	234	290	>00 0
SAMPLE ID 76	DATA F	NPDES SCAN	>	2<	>e	>9	>	1 5¢	₹ N H-114	744	284	234	> 6	4	100	110	160	267

Analytical Serv

REPORT Results by Sample

LAB # 84-07-131 Continued From Above

RECEIVED: 07/23/84

SAMPLE 10 76

FRACTION 04B TEST CODE MS 624
Date & Time Collected 07/18/84

NAME EPA Method 624/6C-MS Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram. All results reported in $\frac{ug/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

DUP 624 DUP 624 DUP 624 DUP 624 01C 02C 03C 04C

RECEIVED: 08/01/84

Analytical Serv

LAB # 84-08-003

Serv REPORT 04/26/85 12:03:31

* Indicates a value less than 5 times the detection limit. CONTACT COMOVER second column confirmation performed on samples CERTIFIED BY Potential error for such low values ranges between PREPARED Radian Analytical Services Footnotes and Comments Duplicate of report of OB/16/84 Austin, Texas 78766 60, 6G, 7F 8501 MoPac Blvd (512) 454-4797 Box 9948 2A, 6C, P. 0 50 and 100% ATTEN ¥ Note: D-SAMPLES 601 ATTEN William Little monitor wells, 212-027-21-05 3910 inker AFB REPORT Radian Austin NS, DG TINKER Fed Ex B1. 4 TAKEN # WORK ID TRANS CLIENT COMPANY TYPE FACILITY INK ص ن ن

specific matrix was not within acceptable limits indicating @ Indicates that spike recovery for this analysis on the Analytical Serv TEST CODES and NAMES used on this report <u>an interferent present</u>

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SAMPLE IDENTIFICATION

PAGE 2 RECEIVED: 08/01/84

Analytical Serv REPURT Results by Sample

LAB # 84-08-003

SAMPLE ID 2A CONC. FACTOR SCAN H-116 A H-116	COMPOUND Chighton Trichloroflu 1,1-Dich trans-1,2-Dich	orome Chloroe Chloroe Chloroe Chloroe Chloroe	pung pung	B	Specified Category VST MCL COMPOUNDS DETECTED BY USG TENT MCL COMPOUNDS DETECTED BY USG Trichloroethene * ND 1,1,2-Trichloroethene * ND 2-Chloroethylvinyl Ether ND 2-Chloroethylvinyl Ether ND 1,1,2,2-Tetrachloroethylene # 22.5 Tetrachloroethylene # 22.5 Chlorobenzene ND 1,1,2,2-Tetrachloroethylene # 22.5 Chlorobenzene ND
10	1,2-1	1,2-Bichloroethane 1,1,1-Trichloroethane	<u>Q</u> 6		1,2-Bichlorobenzene NB 1,4-Bichlorobenzene NB
9	Carbon Tetrachlor Bromodichlorometh 1,2-Bichloroprop trans-1,3-Dichloroprop		الكانا الكانكا		

PAGE 3 RECEIVED: 08/01/84

Results by Sample Analytical Serv

LAB # 84-08-003 Continued From Above

SAMPLE ID 2A

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified

Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{ug/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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Analytical Serv Results by Sample

LAB # 84-08-003

PAGE 4 RECEIVED: 08/01/84

SAMPLE ID 60		TEST CODE GC 601	AME EPA Method 601/GC Category
DAIA FILE CONC. FACTOR	<u>B</u> DATE INJECTED <u>QB/QB/B4</u>	ANALYST INSTRUMENT	MCL VERIFIED BY JSG COMPOUNDS DETECTED 4
SCAN	COMPOUND	SCAN	COMPOUND RESULT
	Chloromethane NB	יטן	Trichloroethene 3.1
	Bromomethane ND		Dibromochloromethane * NB
	Vingl Chloride NB		1,1,2-Trichloroethane * NB
71.00	Chloroethane NB	C i S	cis-1, 3-Bichloropropene * ND
The specimens	Methylene Chloride NB		2-Chloroethylvinyl Ether NB
H	Trichlorofluoromethane G.4	A que alquesar	Bromoform ND
-121	1,1-Bichloroethene NB	1, 1, 2	1, 1, 2, 2-Tetrachloroethane # NB
Cul	1,1-Bichloroethane G.2		Tetrachloroethylene # 0.2
***	trans-1, 2-Bichloroethene ND		Chlorobenzene MB
୯	Chloroform 1.6	and the state of t	1,3-Dichlorobenzene NB
4	1,2-Dichloroethane 6.3		1, 2-Bichlorobenzene NB
	1, 1, 1-Trichloroethane NB		1, 4-Bichlorobenzene MB
	Carbon Tetrachloride NB		
	Bromodichloromethane ND		
december	1,2-Bichloropropane ND		
	trans-1, 3-Dichloropropene NB		

REPORT

LAB # 84-08-003 Continued From Above

PAGE 5 RECEIVED: 08/01/84

SAMPLE 1D 6C

FRACTION 02A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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CORPORATION RECEIVED: 08/01/84

REPORT Analytical Serv

LAB # 84-08-003

Results by Sample

9 ÿ ÿ Ÿ ÿ Ž Ž ÿ RESULT 21. COMPOUNDS DETECTED VERIFIED BY Trichloroethene Bromoform Chlorobenzene 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene 2-Chloroethylvinyl Ether FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC Dibromochloromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene Categorg COMPOUND MCL b Date & Time Collected not specified ANALYST INSTRUMENT SCAN DATE INJECTED 08/08/84 g Ÿ 22.0 O Ni Ž 2 g 9 2 Ž ğ 2 ğ 2 RESULT ĝ ÿ Chloromethane Chloroform Bromomethane Vinyl Chloride Trichlorofluoromethane Chloroethane Methylene Chloride 1, 1-Dichloroethene 1, 1-Bichloroethane trans-1, 2-Bichloroethene 1, 2-Dichloroethane 1, 2-Dichloropropane trans-1, 3-Dichloropropene 1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodichloromethane COMPOUND 2 DATA FILE COMC. FACTOR SAMPLE ID 6D SCAN

Analytical Serv

al Serv Results by Sample

LAB # 84-08-003 Continued From Above

SAMPLE 1D 6D

RECEIVED: 08/01/84

FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category.

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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PAGE 8 RECEIVED: 08/01/84

Analytical Serv REPURT Results by Sample

LAB # 84-08-003

NAME EPA Method 601/GC	Category
NAME EF	שר
CODE GC 601	not specific
A LEST	Collected
FRACTION 04A TEST CODE GC 601 NAME E	Date & Time
SAMPLE ID 6E	

Category Category	34 ANALYST MCL VERIFIED BY USG INSTRUMENT b COMPOUNDS DETECTED O	SCAN COMPOUND RESULT	Trichloroethene NB	Dibromochloromethane * NB	1, 1, 2-Trichloroethane * NB	cis-1,3-Bichloropropene * NB	2-Chloroethylvinyl Ether MD	Bromoform NB	1, 1, 2, 2-Tetrachloroethane # NB	Tetrachloroethylene # NB	Chlorobenzene NB	1, 3-Dichlorobenzene NB	1,2-Dichlorobenzene NB	1,4-Bichlorobenzene NB			_
Date & Time Collected		COMPOUND RESULT	Chloromethane NB	Bromomethane NB	Vingl Chloride NB	Chloroethane ND	Methylene Chloride ND	Trichlorofluoromethane NB	1,1-Bichloroethene NB	1,1-Dichloroethane ND	trans-1, 2-Bichloroethene NB	Chloroform NB	1,2-Bichloroethane NB	1, 1, 1-Trichloroethane NB	Carbon Tetrachloride NB	Bromodichloromethane MB	
	DATA FILE CONC. FACTOR	SCAN	was and a second					H-12	25								

2

trans-1, 3-Dichloropropene

9

1,2-Dichloropropane

Results by Sample

REPORT

Continued From Above LAB # 84-08-003

SAMPLE 10 6E

PAGE 9 RECEIVED: 08/01/84

FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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Serv Results by Sample

LAB # 84-08-003

2 380 Ž Ž Z. 2 Z Z ij ű 2 Ÿ ž ÿ RESULT 0.1 COMPOUNDS DETECTED VERIFIED BY Trichloroethene Bromoform 2-Chloroethylvinyl Ether Chlorobenzene i, 3-Bichlorobenzene 1, 2-Dichlorobenzene 1, 4-Bichlorobenzene FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene Dibromochloromethane cis-1, 3-Dichloropropene 1, 1, 2-Trichloroethane Category COMPOUND 일 Date & Time Collected not specified ANALYST INSTRUMENT SCAN DATE INJECTED 08/09/84 g 2 2 2 2 2 g £ 2 ÿ 9 2 S 밀 ÿ RESULT Ö Chloromethane Vingl Chloride Bromomethane Chloroethane Methylene Chloride Trichlorofluoromethane Chloroform 1, 2-Dichloroethane trans-1, 3-Dichloropropene 1, 1-Dichloroethene 1, 1-Bichloroethane trans-1, 2-Dichloroethene 1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodichloromethane 1, 2-Dichloropropane COMPOUND DATA FILE CONC. FACTOR SAMPLE 10 6F SCAN

RECEIVED: 08/01/84

Analytical Serv

Results by Sample

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Continued From Above LAB # 84-08-003

SAMPLE 10 6F

FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropene co-elute. All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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REPORT

LAB # 84-08-003

Results by Sample

9 98 ož ű ű RESULT COMPOUNDS DETECTED VERIFIED BY Trichloroethene Bromoform Chlorobenzene 1, 3-Bichlorobenzene 1, 2-Bichlorobenzene 1, 4-Dichlorobenzene 2-Chloroethylvinyl Ether FRACTION 06A TEST CODE GC 601 NAME EPA Method 601/GC Tetrachloroethylene Dibromochloromethane 1, 1, 2-Trichloroethane cis-1, 3-Bichloropropene 1, 1, 2, 2-Tetrachloroethane Category COMPOUND ACL b Date & Time Collected not specified ANAL YST INSTRUMENT SCAN DATE INJECTED 08/09/84 물 2 9 g Ö ĝ Ö α (:) 밀 2 2 2 g RESULT Chloromethane Chloroform Bromomethane Vinyl Chloride Chloroethane Trichlorofluoromethane Methylene Chloride 1, 1-Dichloroethene 1, 1-Dichloroethane trans-1, 2-Bichloroethene 1, 2-Bichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodichloromethane COMPOUND 23 DATA FILE CONC. FACTOR SAMPLE 10 6G SCAN

2

trans-1, 3-Dichloropropene

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1, 2-Bichloropropane

Analytical Serv

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REPORT Results by Sample

Continued From Above LAB # 84-08-003

SAMPLE 1D 66

RECEIVED: 08/01/84

FRACTION 06A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. All results reported in ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram.

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Analytical Serv REPORT Results by Sample

LAB # 84-08-003

TEST CODE GC 601 NAME EPA Method 601/GC lected not specified Category	ANALYST RGS VERIFIED BY JSG INSTRUMENT b COMPOUNDS DETECTED 1	SCAN COMPOUND RESULT	Trichloroethene NB	Dibromochloromethane * NB	1, 1, 2-Trichloroethane * MB	cis-1,3-Bichloropropene * NB	2-Chloroethylvinyl Ether NB	Bromoform NB	1, 1, 2, 2-Tetrachloroethane # NB	Tetrachloroethylene # NB	Chlorobenzene MB	1,3-Dichlorobenzene NB	1,2-Dichlorobenzene NB	1,4-Bichlorobenzene NB				
SAMPLE ID 7A FEST C Date & Time Collected	DATA FILE B DATE INJECTED 08/09/84	SCAN COMPOUND RESULT	Chloromethane NB	Bromomethane ND	Vingl Chloride ND	Chloroethane ND	Methylene Chloride ND	1 Trichlorofluoromethane 2.2	1, 1-Dichloroethene ND	1, 1-Dichloroethane ND	trans-1,2-Dichloroethene ND	Chloroform ND	1, 2-Dichloroethane ND	1, 1, 1-Trichloroethane ND	Carbon Tetrachloride ND	Bromodichloromethane ND	1,2-Bichloropropane ND	trans-1, 3-Dichloropropene ND
SAMPLE	DAT CONC.							н-	131									

Analytical Serv

REFORT Results by Sample

LAB # 84-08-003 Continued From Above

SAMPLE 10 7A

RECEIVED: 08/01/84

FRACTION O7A TEST CODE OC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. All results reported in <u>vg/L</u> unless otherwise specified. SCAN = scan number or retention time on chromatogram.

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Analytical Serv Results by Sample

LAB # 84-08-003

TEST CODE GC 601 NAME EPA Method 601/GC ected not specified Category	ANALYST RGS VERIFIED BY JSG INSTRUMENT COMPOUNDS DETECTED 1	SCAN COMPOUND RESULT	Trichloroethene NB	Dibromochloromethane * NB	1, 1, 2-Trichloroethane * NB	cis-1,3-Bichloropropene * NB	2-Chloroethylvinyl Ether NB	Bromoform ND	1, 1, 2, 2-Tetrachloroethane # NB	Tetrachloroethylene # NB	Chlorobenzene MB	1, 3-Dichlorobenzene NB	1, 2-Dichlorobenzene NB	1, 4-Dichlorobenzene NB				
FRACTION OBA TEST CODE Date & Time Collected not	B DATE INJECTED 08/09/84	COMPOUND	Chloromethane ND	Bromomethane ND	Vinyl Chloride NB	Chloroethane ND	Methylene Chloride ND	Trichlorofluoromethane 0.5	1,1-Dichloroethene ND ;	1,1-Dichloroethane ND	trans-1, 2-Dichloroethene ND	Chloroform ND :	1, 2-Dichloroethane ND	1, 1, 1-Trichloroethane ND	Carbon Tetrachloride ND	Bromodichloromethane ND	1,2-Dichloropropane ND	trans-1, 3-Dichloropropene NB :
SAMPLE ID 7C	DATA FILECONC. FACTOR	SCAN				The state of the s		H-]	133								- The second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section in the second section is the second section in the second section is the second section in the second section is the second section in the second section is the second section in the second section is the second section in the second section is the second section in the second section is the second section in the section is the second section in the section is the second section in the section is the section in the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the section is the section in the sec	

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REPURT Results by Sample

Continued From Above LAB # 84-08-003

SAMPLE 10 7C

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FRACTION OBA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified

Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropene co-elute. All results reported in uq/L unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram

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Analytical Serv REPORT Results by Sample

LAB # 84-08-003

SAM	SAMPLE ID 7F		FRAC	FRACTION OPA TEST C Date & Time Collected	言言		NAME EPA Method 601/GC	
DAT CONC.	DATA FILE C. FACTOR	හ <u>ු</u>	DATE INJECTED	D 08/09/84	ANALYST	RGS t	VERIFIED BY COMPOUNDS DETECTED	7 <u>56</u>
	SCAN	2 00	COMPOUND	RESULT	SCAN	COMPOUND		RESULT
			Chloromethane	QN	4	T.	Trichloroethene	0.6
			Bromomethane	QN e		Dibromochl	Dibromochloromethane *	ND ND
			Vinyl Chloride	QN		1, 1, 2-Trich	1,1,2-Trichloroethane *	Ü
			Chloroethane	13.3		cis-1,3-Bichloropropene	loropropene *	S.
	CV	Met	Methylene Chloride	8 9		2-Chloroethylvinyl	hylvinyl Ether	Ÿ
F		Trichle	Trichlorofluoromethane	e ND			Bromoform	N
i-135	***************************************	1.1	1, 1-Bichloroethene	a QN	1	1,1,2,2-Tetrachloroethane	hloroethane #	N N
•		1,1	1,1-Dichloroethane	e GN		Tetrachlo	Tetrachloroethylene #	ğ
		trans-1,2	trans-1,2-Dichloroethene	a ON	5		Chlorobenzene	4 ي
	e		Chloroform	m 19.2		1, 3-Di	1,3-Dichlorobenzene	Q
		5,1	1,2-Bichloroethane	QN G	6	1, 2-Bi	1,2-Dichlorobenzene	6.5
		1.1.1	1,1,1-Trichloroethane	GN e		1, 4-Bi	1,4-Bichlorobenzene	Ÿ.
		Carbo	Carbon Tetrachloride	a GN				
		Bromo	Bromodichloromethane	QN e				
		-d 'I	1,2-Dichloropropane	GN G				
		trans-1,3-	trans-1,3-Dichloropropene	e ND				

RECEIVED: 08/01/84

serv Results by Sample Analytical Serv

REPORT

Continued From Above LAB # 84-08-003

SAMPLE 10 7F

FRACTION 09A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified

Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE DUP 601 DUP 601 DUP 601 DUP 601 DUP 601 DUP 601 0118 0028 0048 0058 0078 0078

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Analytical Serv

REPURT 04/26/85 12:06:04

LAB # 84-08-013

RECEIVED: 08/01/84

CORPORATION

* Indicates a value less than 5 times the detection limit. CONTACT CONDVER KRTIFIED BY Potential error for such low values ranges between 50 and 100%. PREPARED Radian Analutical Services Footnotes and Comments Duplicate of report of OB/17/84 Austin, Texas 78766 8501 MoPac Blvd (512) 454-4797 P. O. Box 994B ž PHOME ATTEN SAMPLES Monitoring Wells express ATTEN William Little 212-027-21-05 Tinker AFB federal REPORT Radian Austin NS/DHG TINKER 3911 **120** WORK ID TAKEN CLIENT TRANS COMPANY TYPE FACILITY ZN.

specific matrix was not within acceptable limits indicating @ Indicates that spike recovery for this analysis on the an interferent present

> SAMPLE IDENTIFICATION

99

Analytical Serv TEST CODES and NAMES used on this report' M625 A Method 625 Acid Compounds M625 B Method 625 Base/Neutrals MS 624 EPA Method 624/GC-MS

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RECEIVED: 08/01/84

SAMPLE 1D 6D

REPURT

LAB # 84-08-013

al Serv Results by Sample FRACTION OIA TEST CODE M625 A
Date & Time Collected 07/31/84

A NAME Method 625 Acid Compounds Category

VERIFIED BY LAK COMPOUNDS DETECTED O	
ANALYST BWS INSTRUMENT	
DATE EXTRACTED <u>08/01/84</u> DATE INJECTED <u>08/06/84</u>	
DATA FILE <u>2CUOBO13CO1</u> CDNC. FACTOR	

RESULT	MD	Z C	QV QV	QN	ND	•
COMPOUND	4-nitrophenol	2,4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	p Heno I	
EPA	SBA	59A	60A	64A	65A	
NPDES SCAN	7A	ເນ ⊄	4 A	9. A.	10A	
RESULT	QN	Q	Q	Q	Ö	Q
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2, 4-dichlorophenol	2, 4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	34A	57A
NPDES SCAN	11A	ВА	₹ H-13	₹ ≈	∀ e	6 A

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84). All results reported in ug/L unless otherwise specified

RECEIVED: 08/01/84

REPORT Analytical Serv

Results by Sample

LAB # 84-08-013

2 밀 2 Ž 2 2 S 2 2 밀 ğ LAK 2 Z Ž Ž 밀 RESULT NAME Method 625 Base/Neutrals COMPOUNDS DETECTED VERIFIED BY C di-butyl phthalate diethyl phthalate ⋖ benzo(a)pyrene T acenaphthylene bis(2-ethylhexyl)phthalate butyl benzyl phthalate di-n-octyl phthalate dimethyl phthalate N-nitrosodimethylamine M-nitrosodiphenylamine N-nitrosodi-n-propylamine benzo(a)anthracene benzo(b)fluoranthene benzo(k)fluoranthene chrysene anthracene Category COMPOUND BMB TEST CODE M625 Date & Time Collected 07/31/84 75B 768 778 78B EPA 618 63B **66B 67B 68B 69B** 7GB 718 72B 73B 74B ANALYST 62B INSTRUMENT NPDES SCAN 41B 43B 42B 138 158 26B 298 248 25B S 100 9 78 日か 188 0 380 DATE EXTRACTED 08/01/84 DATE INJECTED 08/06/84 FRACTION OIA 물 2 2 Ÿ 밀 2 2 9 2 S 2 g 문 문 RESULT 2 S acenaphthene 1, 2-dichlorobenzene 1, 3-dichlorobenzene 1, 4-dichlorobenzene 3, 3 'dichlorobenzidine 2, 4-dinitrotoluene 2,6-dinitrotoluene 1,2-diphenylhydrazine fluoranthene 40B 4-chlorophenyl phenyl ether benzidine 1, 2, 4-trichlorobenzene hexachlorobenzene hexach loroethane bis(2-chloroethyl)ether 2-chloronaphthalene COMPOUND CONC. FACTOR 2 EPA 3 3 3 88 25B 26B 27B 28B 358 36B 37B 398 13 98 12B 188 20B SAMPLE ID 60 NPDES SCAN 318 468 300 368 118 16B 20B 218 228 238 27B 288 39B 17B 48

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Analytical Serv CORPORATION

NAME Method 625 Base/Neutrals LAB # 84-08-013 Continued From Above FRACTION OIA TEST CODE M625 B Serv REPORT Results by Sample PAGE 4 RECEIVED: 08/01/84 SAMPLE ID 60

		Date &	te & Time Collected 07/31/84	erted	07/31/84	Category
148	418	4-bromophenyl phenyl ether	Q	22 28	798	benzo(ghi)perylene NB
128		42B bis(2-chloroisopropyl)ether	GN G	32B	808	fluorene MD
108	43B	bis(2-chloroethoxy}methane	GN	44B	818	phenanthrene B NB
348	528	hexachlorobutadiene	Q	198	828	dibenzo(a, h)anthracene NB
355	93B	hexachlorocyclopentadiene	Q	37E	838	indeno(1, 2, 3-cd)pyrene ND
388	548	isophorone	QN	45B	B4B	<u>ON</u> euelfd
398	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	naph thalene	Q			
NOTES	AND	DEFINITIONS FOR THIS REPORT nzene	 Q			

SCAN = scan number or retention time on chromatogram.

All results reported in <u>ug/L</u> unless otherwise specified

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

= benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

= benzo(a)anthracene and chrysene co-elute in high concentrations.

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= anthracene and phenanthrene co-elute in high concentrations m

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RECEIVED: 08/01/84

REPORT

Results by Sample

LAB # 84-08-013

ű Z Ĭ 문 ÿ Z 2 S S ğ LAK 2 ä ğ Z 2 ğ RESULT VERIFIED BY COMPOUNDS DETECTED NAME EPA Method 624/GC-MS bromoform chlorodibromomethane tetrach loroethylene tolvene trichloroethylene vinyl chloride ethylbenzene methylene chloride methyl chloride methyl bromide dichlorobromomethane trich lorofluoromethane dichlorodifluoromethane 1, 2-dichloropropane cis-1, 3-dichloropropylene 33V trans-1, 3-dichloropropylene Categorg COMPOUND BMB TEST CODE MS 624 Date & Time Collected 07/31/84 216 200 798 278 200 440 460 470 490 200 288 EPA 320 286 450 480 ANALYST INSTRUMENT NPDES SCAN 316 17 224 214 200 <u>ک</u> 12 200 707 š 240 いるの >60 0 184 180 197 DATE INJECTED 08/02/84 2 9 g FRACTION OIB 일 Ñ 물 밁 Ž S ÿ ğ Ÿ S 2 8 문 RESULT chloroform acrolein 1, 2-trans-dichloroethylene acrylonitrile benzene carbon tetrachloride chlorobenzene 1, 2-dichloroethane 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane chloroethane bis (chloromethyl) ether 2-chloroethylvinyl ether 1, 1-dichlorosthylene COMPOUND CONC. FACTOR 4CUOBO13VO1 200 EPA 150 177 117 138 140 160 190 234 294 2 8 \$ 3 ? 305 SAMPLE 10 60 475 NPDES SCAN 2 ? 2 \$ 115 167 Š 'n **\$** 284 200 > 6 <u></u>200 267 , 4 <

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Analytical Serv REPORT Results by Sample

LAB # 84-08-013 Continued From Above

SAMPLE ID 6D

FRACTION OIB TEST CODE MS 624 Date & Time Collected 07/31/84

Category

NAME EPA Method 624/GC-MS

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in $\frac{uq/1}{1}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

Analytical Serv

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SAMPLE 1D 6E

REPORT Results by Sample

LAB # 84-08-013

FRACTION 02A TEST CODE M625 A NAME Method 625 Acid Compounds
Date & Time Collected 07/30/84 Category

VERIFIED BY LAK COMPOUNDS DETECTED BMS INSTRUMENT DATE INJECTED 08/06/84 DATE EXTRACTED 08/01/84 DATA FILE <u>2CU0B013C02</u>

RESULT	Ü	Ÿ	Ü	ON CO	S.	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
EPA	58A	59A	60A	64A	65A	
RESULT NPDES SCAN	7A	ų A	4 A	9A	10A	
RESULT	QN	Ö	Q	Q	QN	Q
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	344	57A
NPDES SCAN	114	84	₹ H-	₹ N	AG.	6.A

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND=not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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Analytical Serv Results by Sample

LAB # 84-08-013

NAME Method 625 Base/Neutrals Category	BWS VERIFIED BY LAK COMPOUNDS DETECTED O	COMPOUND	N-nitrosodimethylamine NB	N-nitrosodiphenylamine MB	N-nitrosodi-n-propylamine NB	bis(2-ethylhexyl)phthalate NB	butyl benzyl phthalate NB	di-butyl phthalate NB	di-n-octyl phthalate NB	diethyl phthalate ND	dimethyl phthalate NB	benzo(a)anthracene A NB	benzo(a)pyrene ND	benzo(b)fluoranthene * NB	benzo(k)fluoranthene * NB	chrysene A ND	acenaphthylene ND	anthracene B <u>ND</u>
TEST CODE M625 B ected 07/30/84	ANALYSTINSTRUMENT	SCAN EPA	618	62B	829	66B b	678	889	869	708	718	728	738	748	758	768	778	788
TEST Ilected		NPDES 8	413	43B	42B	138	158	26B	298	248	258	<u>a</u>	89	78	98	188	28	a e
FRACTION OZA TEST (Date & Time Collected	08/01/84 08/06/84	RESULT	QN	gN	QN	GN	QN	GN	g	QN	GN	QN	QN	g	ON	Q	9	Q
FRACT)	DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1,2,4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2,4-dinitrotoluene	2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	henyl phenyl ether
	2CV08013C01	∢.	2 21	œ		m	en.							m	~			4-chlorophenyl
10 6E	DATA FILE 20 NC. FACTOR _	SCAN EPA	<u>~</u>	3B	88	86	128	188	208	258	268	278	288	358	368	378	398	40B
SAMPLE ID 6E	DATA CONC. FA	NPDES SC	18	48	46B	866	368	₽ ₩ H-145	168	208	218	22B	23B	278	288	298	318	178

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Analytical Serv REPORT Results by Sample

LAB # 84-08-013 Continued From Above

NAME Mothod 435 Baco/Noutrale TECT FORE MEDE D CDAPTION AND CAMBIE IN LE ۵l

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	병	PKAC	LUN UEA	ES C ected	FRACTION UZA TEST COME M623 B Date & Time Collected 07/30/84	NAME Method ogo base/Neutrals Category	A
148	418	4-bromophenyl phenyl	QN	88	798	benzo(ghi}perylene	2
12B	42B	42B bis(2-chloroisopropyl)ether	QN .	328	808	fluorene ME	뜆
108	43B	bis(2-chloroethoxy}methane	QN	448	818	phenanthrene B NI	문
348	52B	hexachlorobutadiene	QN	198	828	dibenzo(a, h)anthracene M	2
338	538	hexachlorocyclopentadiene	QN	378	838	indeno(1,2,3-cd)pyrene M	2
388	548	isophorone	QN	458	848	pyrene Ni	묏
360	900	naphthalene	ÖN				
NOTES /	AND DEFIN	DEFINITIONS FOR THIS REPORT niene	QN				

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SCAN = scan number or retention time on chromatogram.

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All results reported in <u>ug/L</u> unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

A=benzo(a)anthracene and chrysene co-elute in high concentrations.

= anthracene and phenanthrene co-elute in high concentrations. m

Analytical Serv REPORT Results by Sample

LAB # 84-08-013

52	BY LAK	RESULT	GN	QN	GN CH	NÜ	NÜ	N	ND	ND	NÜ	ND	ΩN.	OM	ŭ.	51	NE	GN
NAME EPA Method 624/GC-MS Category	BWS VERIFIED BY COMPOUNDS DETECTED	COMPOUND	1,2-dichloropropane	cis-1,3-dichloropropylene	trans-1,3-dichloropropylene	ethylbenzene	methylene chloride	methyl chloride	methyl bromide	bromoform	dichlorobromomethane	trichlorofluoromethane	dichlorodifluoromethane	chlorodibromomethane	tetrachloroethylene	toluene	trichloroethylene	vinyl chloride
MS 624 30/84	ANALYST	EPA	756	334	337 4	380	440	45 V	460	470	48V	49V	300	916	857	867	876	286
r code ed 07/3	ANALYST INSTRUMENT	SCAN														453		
ler te		NPDES	170	187	187	190	227	214	204	Š	124	A06	134	B	247	250	A60	316
TON O2B TEST CODE MS 6 & Time Collected 07/30/84	<u>08/02/84</u>	RESULT	S	QN	QN	QN	QN	Q	QN	Q	GN .	Q	QN	g	QN	Q	QN	GN
FRACTION 02B Date & Time C	DATE INJECTED	COMPOUND	acrolein	acrylonitrile	benzene	carbon tetrachloride	chlorobenzene	1,2-dichloroethane	1,1,1-trichloroethane	1,1-dichloroethane	1,1,2-trichloroethane	1,1,2,2-tetrachloroethane	chloroethane	(chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1,1-dichloroethylene	1,2-trans-dichloroethylene
	4008013V02	Ü				Cat		,~	1, 1,	Y-4		1,1,2,2-		bis (ch	2-chlor		**************************************	1,2-trans
QE	1LE 4CU	R EPA	24	3€	4	^9	2	100	116	134	144	150	167	170	190	237	297	300
SAMPLE 1D 6E	DATA FILE CONC. FACTOR	NPDES SCAN	10	25	>e	>9	7<	н-	≳ 147	140	284	237	> 6	4	100	110	167	567

Analytical Serv

Results by Sample

REPORT

LAB # 84-08-013 Continued From Above

SAMPLE 1D 6E

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FRACTION 02B TEST CODE MS 624 NAME EPA Method 624/GC-MS Date & Time Collected 07/30/84 Category

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in <u>uq/l</u> unless otherwise specified. SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

Analytical Serv

RECEIVED: 08/01/84

SAMPLE ID 6F

REPURT

LAB # 84-08-013

Results by Sample

FRACTION 03A TEST CODE M625 A NAME Method 625 Acid Compounds Date & Time Collected 07/30/84

Category

DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84 DATA FILE 20008013003 CONC. FACTOR

INSTRUMENT

VERIFIED BY LAK COMPOUNDS DETECTED

BMB

RESULT	ÜN	ÜN	Ü	Ü	ü	
COMPOUND	4-nitrophenol	2,4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	p Neno 1	
EPA	58A	59A	60A	64A	65A	
NPDES SCAN	; 7A	ę,	4 A	₽	10A	
RESULT	Q	Ü	ũ	Q	Ü	Ö
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenal	2, 4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	34A	57A
NPBES SCAN	11A	84	14	∢ N H−14	₹ 6	6A

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

ug/L unless otherwise specified. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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LAB # 84-08-013

Analytical Serv Results by Sample

MG25 B NAME Method 625 Base/Neutrals WENT Category VERIFIED BY LA TENT COMPOUND DETECTED COMPOUND DETECTED ASB N-nitrosodimethylamine N ASB N-nitrosodinethylamine N ASB N-nitrosodi-n-propylamine N ASB butyl benzyl phthalate N ASB di-butyl phthalate N Aiethyl phthalate N Aie benzo(a)anthracene A Aiethyl benzo(a)fluoranthene * N Aiethyl benzo(k)fluoranthene * N	thylen cene
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	77B 78B
### RESULT NPDES SCAN EPA there ND 15B 62B there ND 15B 62B there ND 15B 62B there ND 24B 62B there ND 24B 62B there ND 24B 62B there ND 25B 67B zene ND 25B 67B tene ND 25B 72B dine ND 25B 72B dine ND 25B 72B dine ND 25B 72B dine ND 25B 72B dine ND 25B 73B dine ND 25B 73B dine ND 25B 73B dine ND 25B 73B dine ND 25B 73B dine ND 35B 73B dene ND 78 75B uene ND 78 75B	3 8 8 8 5 8 8
N O3A O8/01/84 O8/06/84	
FRACTION O3A Date & Time Bate	fluoranth phenyl et
2CU08013C03 2	39B 40B 4-chlorophenyl
	398 408 4-
A HE A	318
SAMPLE ID 6F CONC. FACTOR DATA FILE CONC. FACTOR 1B 44B 44B 33B 33B 33B 22B 22B 22B 22B 22B 22B 22	

PAGE 14 RECEIVE	PAGE 14 RECEIVED: 08/01/84		Analytical Serv Results by Sample	REPURT y Sample		LAB # 84-08-013 Continued From Above
SAMPLE ID 6F	10 6F		FRACTION O3A TEST CODE M625 Date & Time Collected 07/30/84	TEST CO	TEST CODE M625 B ected 07/30/84	NAME Method 625 Base/Neutrals Category
148	418	4-bromophenyl ph	phenyl ether NB	28	798	benzo(ghi)perylene MD
128	42B b	bis(2-chloroisopropyl)eth	opyllether ND	328	808	fluorene NB
108	438	bis(2-chloroethoxy)metha	xy}methane NB	448	818	phenanthrene B NB
348	52B	hexachlorobutadie	obutadiene ND	198	828	dibenzo(a, h)anthracene ND
890	93B	hexachlorocyclopentadiene	pentadiene ND	37B	838	indeno(1,2,3-cd)pyrene NB
388	548		isophorone ND	458	848	gn eneith
86€	558	£	naphthalene ND			
NOTES AN	AND DEFINIT	DEFINITIONS FOR THIS REPORT niene	PORT, nzene ND	··· ···		
	SCAN = scan	scan number or retention time	ition time on chromatogram	atogram.		
₹ H-15	All results	reported in	uq/L unless otherwise	ise specified	ied.	•
9	= not	detected at EPA de	detection limit method	625,	(Federal Reg	Register, 11/26/84}.
*	= benzo(b	benzo(b)fluoranthene and	id benzo(k)fluoranthene	hene co-elute	ute.	
∢	= benzo(a	benzo(a)anthracene and	chrysene co-elute	in high co	concentrations	កន.
ш	= anthracene	ene and phenanthrene	co-elute in	high concer	concentrations.	

Analytical Serv Results by Sample

LAB # 84-08-013

CM COS PET FINE VOLUMENT

Method 624/GC-MS Category	VERIFIED BY LAK DS DETECTED O	RESULT	opropane <u>ND</u>	opylene NE	ropylene MD	ethylbenzene <u>ND</u>	chloride NB	chloride NB	bromide NE	bromoform MB	omethane <u>NE</u>	omethane <u>ND</u>	omethane MB	omethane <u>MB</u>	ethylene <u>MD</u>	toluene ND	ethylene <u>NB</u>	chloride NB
NAME EPA	BWS COMPOUNDS	COMPOUND	1,2-dichloropropane	cis-1, 3-dichloropropylen	trans-1, 3-dichloropropylene	ethyl	methylene c	methyl o	methy!	1 d	dichlorobromomethan	trichlorofluoromethan	dichlorodifluoromethane	chlorodibromomethane	tetrachloroethylen		trichloroethylene	vinyl
ACTION 03B TEST CODE MS 624 te % Time Collected 07/30/84	ANALYST	SCAN EPA	320	>ee	330 tr	386	44	450	467	470	480	490	200	510	956	A 78	877	>28
TEST (N.	NPDES SC	170	187	187	190	227	210	207	> 5	120	306	130	>8 8	247	257	296	310
FRACTION OBB Date & Time Co	08/02/84	RESULT	QN	QN	QN N	GZ	g	g	Q	Q	ÖN	Ü	Q	Q	Q	92	Q	GN GN
FRACTI Date			acrolein	₩ ₩	benzene	ide	9 2	a a a	ane	ė G G	9 2 9	ane	hane	ether	ether	form	glene	Jene
	DATE INJECTED	OMPOUND	4070	acrylonitri	ben	bon tetrachlori	chlorobenzene	,2-dichloroeth	1-trichloroeth	,1-dichloroeth	2-trichloroeth	tetrachloroeth	chloroethane			chloroform	-dichloroeth	-dichloroeth
		COMPOUND	acro	acrylonit	ueg	carbon tetrachlo	chlorobenz	1,2-dichloroethane	1,1,1-trichloroethane	1,1-dichloroethane	1,1,2-trichloroethane	1, 1, 2, 2-tetrachloroethane	chloroet	bis (chloromethyl) e	2-chloroethylvinyl e	chloro	1,1-dichloroethylene	1,2-trans-dichloroethylene
SAMPLE ID 6F	DATA FILE <u>4CUOBO13VO3</u> DATE INJE	SCAN EPA COMPOUND	2V acro	3V acrylonit	4V ben		7V chlorobenz	10V 1,2-dichloroeth	11V 1,1-trichloroeth	13V 1,1-dichloroeth	14V 1,2-trichloroeth	15V 1,1,2,2-tetrachloroeth	16V chloroet			23V chloro	29V 1,1-dichloroeth	30V 1,2-trans-dichloroeth

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Composition of the Analytical

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Analytical Serv Results by Sample

LAB # 84-08-013 Continued From Above

SAMPLE 1D 6F

FRACTION 03B TEST CODE MS 624
Date & Time Collected 07/30/84

Category

NAME EPA Method 624/GC-MS

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in $\frac{uq/l}{}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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SAMPLE 10 66

REPORT Analytical Serv

Results by Sample

FRACTION 04A TEST CODE M625 A NAME Method 625 Acid Compounds Date & Time Collected 07/30/84 Category

LAB # 84-08-013

BMS INSTRUMENT DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84 DATA FILE 20008013004 CONC. FACTOR

VERIFIED BY COMPOUNDS DETECTED

AK O

RESULT	QN	Ü	QN	N D	QN	
COMPOUND	4-nitrophenol	2,4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	p heno 1	
EPA	SBA	59A	60A	64A	65A	
NPDES SCAN	7A	S,A	4 4	94	10A	
RESULT	Q	QN	CN	QN	ON	Q
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	34A	57A
NPDES SCAN	114	8A A	A A	₹ ci H-1	∜ m 54	6 A

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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Analytical Serv Results by Sample

LAB # 84-08-013

Base/Neutrals ry	IFIED BY LAK DETECTED O	RESULT	ND	e ND	e e	9 P	e ND	e ND	a ND	a a	e ON	A ND	e MD	*	WD *	A ND	e WD	a ND
B NAME Method 625 Base/N Category	BWS COMPOUNDS DETEC	COMPOUND	M-nitrosodimethylamine	N-nitrosodiphenylamin	N-nitrosodi-n-propylamin	bis(2-ethylhexyl}phthalat	butyl benzyl phthalat	di-butyl phthalat	di-n-octyl phthalat	diethyl phthalat	dimethyl phthalat	benzo(a)anthracene	benzo(a)pyrene	benzo(b)fluoranthene	benzo(k)fluoranthene	chrysene	acenaphthylene	anthracene
TEST CODE M625 ected 07/30/84	ANALYST INSTRUMENT	SCAN EPA	618	62B	859	648	678	889	898	708	718	72B	738	74B	758	768	778	788
TEST	Ž	NPDES S	418	438	42B	138	158	268	29B	24B	258	8	g 9	78	98	18B	20	en en
FRACTION O4A TEST Date & Time Collected	08/01/84 08/06/84	RESULT	Q	Q	9	QN	Q	QN	GN	QN	QN	QN	QN	Q	QN	GN	GN	ND ND
FRACTI Date 8	DATE EXTRACTED DATE INJECTED	самраимь	acenaphthene	benzidine	1,2,4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2, 4-dinitrotoluene	2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	enyl phenyl ether
	2CU08013C04				1,2,4			bis(2-	ณ่	7,	7,		e e		(y			4-chlorophenyl
99 (AN EPA	18	S.	88	日台	128	188	208	258	268	278	288	358	368	378	39B	40B
SAMPLE ID 66	DATA FILE CONC. FACTOR	NPBES SCAN	18	48	468	338	368	H	മ എ -155	20B	218	22B	23B	278	288	298	318	178

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Analytical Serv REPURT Results by Sample

LAB # 84-08-013 Continued From Above

SAMPLE ID 66	99		FRACTION 04A TEST CODE M625 Date & Time Collected 07/30/84	TEST	TEST CODE M625 B ected 07/30/84	NAME Method 625 Base/Neutrals Category
148	418	4-bromophenyl phenyl et	ther ND	88	798	benzo(ghi)perylene ND
128	42B	bis(2-chloroisopropyl)ether	her ND	328	808	fluorene NB
108	43B	bis(2-chloroethoxy}meth	thane ND	448	818	phenanthrene B ND
348	52B	hexachlorobutadi	iene ND	19B	828	dibenzo(a,h)anthracene ND
358	33B	hexachlorocyclopentadi	iene ND	378	838	indeno(1,2,3-cd)pyrene NB
386	54B	isophor	rone ND	458	848	pyrene NB
360	558	naphthal	lene ND			
NOTES AND	DEFINI	DEFINITIONS FOR THIS REPORT, nz	Zene ND			

SCAN = scan number or retention time on chromatogram.

All results reported in <u>ug/L</u> unless otherwise specified.

H-156

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

A=benzo(a)anthracene and chrysene co-elute in high concentrations.

= anthracene and phenanthrene co-elute in high concentrations 8

CORPORATION RECEIVED: 08/01/84

REPURT Analutical Serv

LAB # 84-08-013

Results by Sample

AK W Ĭ 2 RESULT 2 ŭ ÿ 2 Z 밀 Ÿ ä ŭ ÿ Ĭ ÿ 1886 VERIFIED BY COMPOUNDS DETECTED NAME EPA Method 624/GC-MS 1,2-dichloropropane cis-1, 3-dichloropropylene 33V trans-1, 3-dichloropropylene ethylbenzene methylene chloride methyl chloride bromoform toluene vinyl chloride methyl bromide dichlorobromomethane trich lorofluoromethane dichlorodifluoromethane chlorodibromomethane tetrachloroethylene trichloroethylene Category COMPOUND BMS 4 FRACTION 04B TEST CODE MS 624 Date & Time Collected 07/30/84 200 447 460 ANALYST INSTRUMENT 320 286 450 47< 48V 794 200 215 ンとの NPDES SCAN EPA 850 258 288 448 174 200 184 184 190 224 214 202 3 124 316 300 13€ 290 いない 3 DATE INJECTED 08/02/84 9 RESULT ĝ 33 물 g 2 웊 2 9 2 ű 물 11 S 엹 2 acrolein acrylonitrile 1, 2-dichloroethane benzene carbon tetrachloride chlorobenzene 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane chloroethane bis (chloromethyl) ether 2-chloroethylvinyl ether chloroform 1,1-dichlorosthylene 1, 2-trans-dichloroethylene COMPOUND DATA FILE 4CU08013V04 200 2 à \$ 3 2 202 117 134 140 150 167 177 190 234 297 SAMPLE 1D 66 327 193 NPDES SCAN à 798 2 à 39 ? 275 284 234 <u>ک</u> \$ 711 750 147 202 167 H-157

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SAMPLE 1D 66

CORPORATION

Analytical Serv

Results by Sample

LAB # 84-08-013 Continued From Above

FRACTION 04B TEST CODE MS 624
Date & Time Collected 07/30/84

NAME EPA Method 624/GC-MS Category

NOTES

SCAN = scan number or retention time on chromatogram. AND DEFINITIONS FOR THIS REPORT.

All results reported in uq/l unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

CORPORATION

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SAMPLE ID 7A

REPORT Analytical Serv

LAB # 84-08-013

Results by Sample

FRACTION OSA TEST CODE M625 A NAME Method 625 Acid Compounds Date & Time Collected 07/31/84 Category

DATA FILE <u>2CUOBO13CO1</u>

DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84

INSTRUMENT ANALYST

BMB

VERIFIED BY LAK COMPOUNDS DETECTED

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EPA		COMPOUND	RESULT	NPDES SCAN	EPA	COMPOUND	RESU
21A		2, 4, 6-trichlorophenol	N	7.4	SBA	4-nitrophenol	
22A		4-chloro-3-methylphenol	ON	e Ag	59A	2, 4-dinitrophenol	
24A		2-chlorophenol	Q	44	60A	2-methyl-4,6-dinitrophenol	
31A		2,4-dichlorophenal	Ö	9.4 4.4	54A	pentachlorophenol	
34A		2,4-dimethylphenol	O	10A	65A	1 ou fru fru fru fru fru fru fru fru fru fr	
57A		2-nitrophenol	ON				

NOTES AND DEFINITIONS FOR THIS REPORT.

 ${\sf SCAN}={\sf scan}$ number or retention time on chromatogram. All results reported in ${\sf ug/L}$ unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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Analytical Serv Results by Sample

LAB # 84-08-013

NAME Method 625 Base/Neutrals Category	BMS VERIFIED BY LAK COMPOUNDS DETECTED O	COMPOUND	M-nitrosodimethylamine NB	N-nitrosodiphenylamine NB	M-nitrosodi-n-propylamine NE	is(2-ethylhexyl)phthalate NB	butyl benzyl phthalate NB	di-butyl phthalate ND	di-n-octyl phthalate NB	diethyl phthalate ND	dimethyl phthalate ND	benzo(a)anthracene A ND	benzo(a)pyrene	benzo(b)fluoranthene * NB	benzo(k)fluoranthene * ND	chrysene A NE	acenaphthylene ND	anthracene B <u>ND</u>
TEST CODE M625 B ected 07/31/84	ANALYST INSTRUMENT	AN EPA	618	628	829	66B b	678	889	869	708	718	728	738	748	758	768	778	788
TEST C		NPDES SCAN	41B	43B	42B	138	158	268	298	24B	258	盟の	89	78	9	188	28	en en
FRACTION OSA TEST Date & Time Collected	<u>08/01/84</u> <u>08/06/84</u>	RESULT	QN	Q	QN	CN	Q	Q	QV	Q	Ü	QN	QN	Q	QN	GN	QN	9
FRACTI Date &	DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1, 2, 4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1, 2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2,4-dinitrotoluene	2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	henyl phenyl ether
	DATA FILE <u>2CUOBO13VOS</u> CONC. FACTOR															1,2		40B 4-chlorophenyl
SAMPLE 10 7A	A FILE 20 FACTOR	SCAN EPA	18	85	88	96	128	188	208	258	268	278	288	328	368	378	398	40B
SAMPLE	DAT CONC.	NPDES	18	48	468	338	368	1.18	E -160	80 €	218	22 B	238	278	288	29B	318	17B

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RECEIVED: 08/01/84

LAB # 84-08-013 Continued From Above

Analytical Serv REPURT Results by Sample

FRACTION 05A TEST CODE M625 B NAME Method 625 Base/Neutrals Date & Time Collected 07/31/84 Category	-bromophenyl phenyl ether ND ; SB 79B benzo(ghi}perylene ND	s(2-chloroisopropyl)ether ND ; 32B 8GB fluorene ND	is(2-chloroethoxy)methane ND ; 44B 81B phenanthrene B ND	hexachlorobutadiene ND : 19B 82B dibenzo(a,h)anthracene ND	nexachlorocyclopentadiene ND ; 37B 83B indeno(1,2,3-cd)pyrene ND	isophorone ND : 45B 84B	naphthalene ND :	DNS FOR THIS REPORT nzeneND :
	4-bromophenyl phenyl et	bis(2-chloroisopropyl)et	bis(2-chloroethoxy}methane		hexachlorocyclopentadiene_		naphthalene	FOR THIS REPORT, NZ
SAMPLE ID 7A	418	42B	43B	52B	33B	548	558	AND DEFINITIONS
SAMPLE	148	128	108	348	338	388	398	NOTES ,

SCAN = scan number or retention time on chromatogram.

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All results reported in <u>ug/L</u> unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a)anthracene and chrysene co-elute in high concentrations.

B = anthracene and phenanthrene co-elute in high concentrations.

CORPORATION

TEST CODE MS 624 NAME EPA Method 624/6C-MS LAB # 84-08-013 Analytical Serv REPURT Results by Sample FRACTION 05B PAGE 25 RECEIVED: 08/01/84 SAMPLE ID 7A

2	BY LAK	RESULT	Z V	Ü	N	ON	N	N	N	S	N	M	N	Ü	Ü	Ę.	N	N
Category	BWS VERIFIED BY 4 COMPOUNDS DETECTED	COMPOUND	1,2-dichloropropane	1,3-dichloropropylene	trans-1,3-dichloropropylene	ethylbenzene	methylene chloride	methyl chloride	methyl bromide) bromoform	dichlorobromomethane	trichlorofluoromethane	dichlorodifluoromethane	chlorodibromomethane	tetrachloroethylene	toluene	trichloroethylene	vinyl chloride
	4	∢	>	n i s		•	_	~	**	_	**							_
07/31/84	ANALYST INSTRUMENT	N EPA	320	>ee	334	387	4	497	460	470	480	490	200	510	850	7 B6V	877	A88
3	AINST	S SCAN	174	187	187	<u>></u>	<u>></u>	>	>	<u>ک</u>	<u>></u>	<u>.</u>	>	8	>	< 449	>	>
Date & Time Collected	34	NPDES	 			190	227	214	504	ເກ 	124	300	134		244) 	590	31<
	<u>08/02/84</u>	RESULT	QN	ND	N	GN	GN.	ON	QN	GN	Q	QN	QN	ND	Q	QN	S	QZ.
	DATE INJECTED	COMPOUND	acrolein	acrylonitrile	ben zene	carbon tetrachloride	chlorobenzene	1,2-dichloroethane	1, 1, 1-trichloroethane	1,1-dichloroethane	1, 1, 2-trichloroethane	1,1,2,2-tetrachloroethane	chloroethane	(chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1,1-dichloroethylene	1,2-trans-dichloroethylene
***************************************	4CU08013V05					ŭ			1,1		H . H	1,1,2,0		bis (c	2-ch10		***	1,2-tran
	-E 4CU	EPA	S	36	4	79	2	100	110	136	140	150	160	170	190	234	297	304
•	DATA FILE CONC. FACTOR	NPDES SCAN	7	24	'n	۸9	2	150	> 2 11-10	52 52	287	237	> 6	45	100	110	167	267
									17-T(J								

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SAMPLE ID 7A

REPORT Analytical Serv Results by Sample

LAB # 84-08-013 Continued From Above

FRACTION 05B TEST CODE MS 624
Date & Time Collected 07/31/84

NAME EPA Method 624/GC-MS
Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram. All results reported in uq/l unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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SAMPLE 10 7C

Analytical Serv

REPORT Results by Sample

LAB # 84-08-013

FRACTION OGA TEST CODE M625 A
Date & Time Collected 07/31/84

Category

NAME Method 625 Acid Compounds

DATE EXTRACTED 08/01/84 DATE INJECTED 08/06/84 DATA FILE 20008013006 CONC. FACTOR

INSTRUMENT

BMB

VERIFIED BY LAK COMPOUNDS DETECTED

RESULT	heno! NE	heno! ND	heno! ND	henol NE	p Neno 1 ND	
COMPOUND	4-nitrophenol	2,4-dinitrophenol	2-methyl-4, 6-dinitrophenol	pentachlorophenol	CL.	
EPA	SBA	59A	60A	64A	65A	
NPDES SCAN	7 A	Ą	44	44	10A	
RESULT	Q	ũ	Q	QN	QN	Q
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2, 4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	344	57A
NPDES SCAN	114	ВВ	₹ H-]	4 61 64	ЭА	6 A

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram. All results reported in ug/L unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84)

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Analytical Serv Results by Sample

LAB # 84-08-013

utrals	BY LAK	RESULT	ND	ON	S S	S	S	S S	2	S	Q.	Ü.	잎	N.	GN	QV.	N	GN .
B NAME Method 625 Base/Neutrals Category	BWS VERIFIED BY	COMPOUND	M-nitrosodimethylamine	M-nitrosodiphenylamine	N-nitrosodi-n-propylamine	bis(2-ethylhexyl}phthalate	butyl benzyl phthalate	di-butyl phthalate	di-n-octyl phthalate	diethyl phthalate	dimethyl phthalate	benzo(a)anthracene A	benzo(a)pyrene	benzo(b)fluoranthene *	benzo(k)fluoranthene *	chrysene A	acenaphthylene	anthracene B
ODE M625 07/31/84	ANALYST _	EPA	618	62B	859	899	67B	989	869	7GB	71B	72B	73B	74B	75B	76B	778	788
Collected 07/3	ANALYST INSTRUMENT	NPDES SCAN	41B	43B	42B	138	158	26B	298	24B	25B	85	89	78	86	188	28	88
5 S	1/84 5/84		밁	 밁	 일	 일	 일	<u> </u>	 일	 일	 2	 일	 일	 9	 g	 덹	된 일	<u> </u>
RACTIUN OGA ate & Time	08/01/84 08/06/84	RESULT		2	2			2	4		2	Z	Z	Z	Z	2	Z	Z
FRACTI Date 8	BATE EXTRACTED DATE INJECTED	самрасив	acenaphthene	benzidine	1,2,4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2,4-dinitrotoluene	2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	nenyl phenyl ether
	2008013006 2				1.2			bis(2	ณ	₩	***	#4	e 'e	•	•	Ċi ~		4-chlorophenyl
2	LE 2CU	EPA	## E	88	88	98	128	188	20B	25B	268	27B	288	358	398	378	398	40B 4
SAMPLE ID 7C	DATA FILE CONC. FACTOR	NPBES SCAN	13	48	46B	acc	368	118	168	20B	218	22B	23B	27B	28B	298	318	17B
&2	Ö	S.			-	,,	`,		H-16!		. 4		1.9	10	. 0	(U	v)	June .

CORPORATION PAGE 29 RECEIVED: 08/01/84

LAB # 84-08-013

REPURT

Analytical Serv

Results by Sample

Ĕ ij 2 NAME Method 625 Base/Neutrals Continued From Above benzo(ghi}perylene fluorene phenanthrene B dibenzo(a, h)anthracene indeno(1,2,3-cd)pyrene pyrene Category FRACTION 06A TEST CODE M625 B
Date & Time Collected 07/31/84 79B BCB 818 82B 838 848 All results reported in <u>uq/L</u> unless otherwise specified SCAN = scan number or retention time on chromatogram. 88 32B 448 19E 37B 45E 呈 S S Ş S 2 ÜZ ON 4-bromophenyl phenyl ether 42B bis(2-chloroisopropyl)ether bis(2-chloroethoxy)methane hexachlorobutadiene hexachlorocyclopentadiene MOTES AND DEFINITIONS FOR THIS REPORT, niene isophorone naph thalene 43B 41B **33B** 52B 54B 55B SAMPLE 10 7C 14B 12B 10B 348 300 880 398 H-166

= benzo(a)anthracene and chrysene co-elute in high concentrations.

·I

= henzo(b)fluoranthene and benzo(k)fluoranthene co-elute

ND= not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

= anthracene and phenanthrene co-elute in high concentrations œ

RECEIVED: 08/01/84

REPORT Results by Sample Analytical Serv

LAB # 84-08-013

NAME EPA Method 624/GC-MS Category TEST CODE MS 624

ÿ ÿ ÿ A A 2 RESULT ۳ VERIFIED BY COMPOUNDS DETECTED 1, 2-dichloropropane 33V trans-1,3-dichloropropylene methyl bromide bromoform cis-1, 3-dichloropropylene ethylbenzene methylene chloride methyl chloride COMPOUND BMS 4 Date & Time Collected 07/31/84 330 EPA 320 ANALYST INSTRUMENT 380 440 450 460 470 NPDES SCAN 170 180 184 761 224 214 204 <u>ک</u> DATE INJECTED 08/02/84 FRACTION 06B 일 RESULT S S S 2 S g 2 acrolein acrylonitrile benzene carbon tetrachloride chlorobenzene 1, 2-dichloroethane 1, 1, 1-trichloroethane 1, 1-dichloroethane COMPOUND DATA FILE 4CU0B013V06 EPA 2 711 200 \$ 3 2 707 134 SAMPLE 10 7C NPDES SCAN 2 જે à 3 2 150 27

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tetrach loroethy lene

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toluene

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1,1-dichloroethylene

200

316

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1, 2-trans-dichloroethylene

200

367

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vinyl chloride

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chlorodibromomethane

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trich lorofluoromethane

dichlorodifluoromethane

dichlorobromomethane

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127

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1, 1, 2-trichloroethane

140

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1, 1, 2, 2-tetrachloroethane

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200

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200

134

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chloroethane

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bis (chloromethyl) ether

2-chloroethylvinyl ether

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chloroform

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Analytical Serv

REPORT Results by Sample

Continued From Above LAB # 84-08-013

SAMPLE 10 7C

FRACTION 06B TEST CODE MS 624
Date & Time Collected 07/31/84

NAME EPA Method 624/GC-MS Category

AND DEFINITIONS FOR THIS REPORT. NOTES

All results reported in <u>uq/l</u> unless otherwise specified. SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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DUP 624 DUP 624 DUP 624 DUP 624 DUP 624

01C 02C 03C 04C 05C

Analytical Serv

Serv REPURT NonReported Work

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

H-169

RECEIVED: 08/02/84

REPORT Radian

2

LAB # 84-08-020

Analytical Serv REPORT 04/26/85 12:10:29

CONTACT CONDVER CERTIFIED BY PREPARED Radian Analytical Services Austin, Texas 78766 8501 MoPac Blvd (512) 454-4797 Box 9948 ص ت PHOME ATTEM SAMPLES

ATTEN William Little

Austin

Tinker AFB

TINKER

CLIENT COMPANY

FACILITY

WORK ID wells, 601

TAKEN TRANS

Fed Ex

second column confirmation performed on samples

Duplicate of report of OB/16/84

6A, 6B, 6B, 6G

No te:

Footnotes and Comments

* Indicates a value less than 5 times the detection limit such low values ranges between Potential error for

50 and 100%

<u>specific matrix was not within acceptable limits indicating</u> @ Indicates that spike recovery for this analysis on the an interferent present

Analytical Serv TEST CODES and NAMES used on this report

GC 601 EPA Method 601/GC

SAMPLE IDENTIFICATION 63 9 50 50 의영입되의

H-170

212-027-21-05

P. O. #

TYPE

3912

INC.

CORPORATION RECEIVED: 08/02/84

Analytical Serv

REPURT

LAB # 84-08-020

Results by Sample

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Category Date & Time Collected not specified

SS 6 ÿ ÿ 물 ğ Ë ű ğ Trichloroethene 444 2.7 ğ Ž ű RESUL 1 VERIFIED BY COMPOUNDS DETECTED Bromoform 2-Chloroethylvinyl Ether Chlorobenzene 1, 3-Bichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene Dibromochloromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene COMPOUND RAM ANALYST INSTRUMENT SCAN DATE INJECTED 08/09/84 밀 g ĝ S e O RESULT ÿ 엹 o. 0 Ž ni Ö 2 Ž rui Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Trichlorofluoromethane 1, 1-Dichloroethene 1, 1-Bichloroethane Chloroform trans-1, 2-Dichloroethene 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodichloromethane 1, 2-Dichloropropane trans-1,3-Dichloropropene COMPOUND T SAMPLE ID 6A DATA FILE CONC. FACTOR SCAN

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Analytical Serv

REPURT Results by Sample

Continued From Above LAB # 84-08-020

SAMPLE ID 6A

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram

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Analytical Serv Results by Sample

LAB # 84-08-020

TEST CODE GC 601 NAME EPA Method 601/GC lected not specified Category	ANALYST RAM VERIFIED BY JSG INSTRUMENT DETECTED 2	SCAN COMPOUND RESULT	7 Trichloroethene 52.8	Dibromochloromethane * NB	1, 1, 2-Trichloroethane * NB	cis-1,3-Dichloropropene * NB	2-Chloroethylvinyl Ether NB	Bromoform NB	1, 1, 2, 2-Tetrachloroethane # NB	Tetrachloroethylene # NE	Chlorobenzene NE	1, 3-Dichlorobenzene NB	1,2-Bichlorobenzene MB	1, 4-Dichlorobenzene NB				
FRACTION OZA TEST CODE Date & Time Collected not	B DATE INJECTED 08/09/84	COMPOUND	Chloromethane ND	Bromomethane ND	Vinyl Chloride ND	. Chloroethane ND	Methylene Chloride ND	Trichlorofluoromethane ND i	1,1-Dichloroethene ND	1,1-Dichloroethane ND	trans-1, 2-Dichloroethene ND	Chloroform 19.6	1, 2-Bichloroethane NB	1, 1, 1-Trichloroethane ND	Carbon Tetrachloride ND	Bromodichloromethane ND	1,2-Dichloropropane NB	trans-1, 3-Dichloropropene ND
SAMPLE ID 68	DATA FILECONC. FACTOR	SCAN						H-1	L73									**************************************

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Analytical Serv

Results by Sample

LAB # 84-08-020 Continued From Above

SAMPLE ID 68

FRACTION O2A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>uq/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

08/02/84

Analytical Serv

REPURT

LAB # 84-08-020

Results by Sample

98 o B ÿ Ë 34.5 RESULT Z Z Z 10.3 밀 COMPOUNDS DETECTED VERIFIED BY Trichloroethene Bromoform Chlorobenzene 1, 3-Bichlorobenzene 2-Chloroethylvinyl Ether 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category Dibromochloromethane 1, 1, 2-Trichloroethane cis-1, 3-Bichloropropene 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene COMPOUND ACL P ANALYST INSTRUMENT SCAN DATE INJECTED 08/09/84 밁 S S g 웆 0 g 2 Z ĝ 2 RESULT 물 S 9 2 Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Trichlorofluoromethane 1, 1-Bichloroethene 1, 1-Dichloroethane Chloroform trans-1, 2-Dichloroethene 1, 2-Bichloroethane trans-1, 3-Dichloropropene Bromodichloromethane 1,2-Dichloropropane 1, 1, 1-Trichloroethane Carbon Tetrachloride COMPOUND 2 SAMPLE ID 6D DATA FILE CONC. FACTOR SCAN

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Analytical Serv

REPURT Results by Sample

LAB # 84-08-020 Continued From Above

SAMPLE 10 60

FRACTION O3A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>vg/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

RECEIVED: 08/02/84

REPURT Results by Sample Analytical Serv

LAB # 84-08-020

986 0.6 2 Z C ÿ Z ÿ Ž RESULT Ž S Z 2 2 VERIFIED BY COMPOUNDS DETECTED Trichloroethene Bromoform 2-Chloroethylvinyl Ether Chlorobenzene 1, 3-Dichlorobenzene 1, 4-Dichlorobenzene 1, 2-Dichlorobenzene FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC Dibromochloromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene Category COMPOUND ACP MC T Date & Time Collected not specified ANALYST INSTRUMENT SCAN DATE INJECTED 08/09/84 문 운 0.6 G. G g S 2 RESULT 2 2 9 2 S 呈 g 9 Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride Chloroform Trichlorofluoromethane 1, 1-Dichloroethane trans-1, 2-Dichloroethene 1, 1-Dichloroethene 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodichloromethane 1,2-Dichloropropane trans-1, 3-Dichloropropene COMPOUND 4 SAMPLE 1D 6G DATA FILE CONC. FACTOR SCAN

SAMPLE ID 66

REPORT Results by Sample Analytical Serv

LAB # 84-08-020 Continued From Above

FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachlorcethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

H-178

RECEIVED: 08/02/84

SAMPLE 10 7G

Analytical Serv

LAB # 84-08-020

REPORT Results by Sample FRACTION 05A TEST CODE OC 601 NAME EPA Method 601/0C

580 ÿ ÿ ű RESULT VERIFIED BY COMPOUNDS DETECTED Trichloroethene Dibromochloromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene Category COMPOUND 30 Date & Time Collected not specified ANAL YST INSTRUMENT SCAN DATE INJECTED 08/10/84 g Ž 웆 2 RESULT Chloromethane Bromomethane Vingl Chloride Chloroethane COMPOUND œ DATA FILE CONC. FACTOR SCAN

ÿ 띺 2 ŭ ÿ Z. Bromoform 2-Chloroethylvinyl Ether Chlorobenzene 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene

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Methylene Chloride

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Trichlorofluoromethane

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1, 1-Bichloroethene

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1, 1-Bichloroethane

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trans-1, 2-Dichloroethene

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Chloroform

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1, 3-Dichlorobenzene

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1, 2-Dichlorobenzene

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1, 4-Dichlorobenzene

g 2 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride

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2 S Bromodichloromethane 1,2-Dichloropropane

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trans-1, 3-Dichloropropene

H-179

RECEIVED: 08/02/84

REPORT Results by Sample Analytical Serv

LAB # 84-08-020 Continued From Above

SAMPLE 10 7G

FRACTION OSA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). SCAN == scan number or retention time on chromatogram.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropene co-elute.

#1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute.

PAGE 12 RECEIVED: 08/02/84

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE DUP 601 DUP 601 DUP 601 DUP 601 018 028 038 048 058

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REPORT

LAB # 84-08-167

* Indicates a value less than 5 times the detection limit. CONTACT CONDVER Note: Second column confirmation performed on Split 4A ERTIFIED BY Potential error for such low values ranges between Services Footnotes and Comments Duplicate of report of 09/05/84 Austin, Texas 78766 PREPARED <u>Radian Analytical</u> BY <u>8501 MoPac Blvd.</u> (512) 454-4797 P. O. Box 9948 50 and 100% ATTEN SAMPLES ATTEN William Little 212-027-21-05 Tinker AFB REPURT Radian Austin TINKER Fed Ex 4 4075 WORK ID 601 9 P. D. # CL IENT COMPANY TAKEN TRANS TYPE FACILITY

SAMPLE IDENTIFICATION

8/15

8/14

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Analytical Serv TEST CODES and NAMES used on this report GC 601 EPA Method 601/GC

<u>specific matrix was not within acceptable limits indicating</u>

an interferent present

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H-182

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Analytical Serv Results by Sample

LAB # 84-08-167

NAME EPA Method 601/GC	Category
FRACTION OIA TEST CODE GC 601 NAME	llected not specified
FRACTION OIA	Date & Time Co
E 10 6E	

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Results by Sample Analytical Serv

REPORT

Continued From Above LAB # 84-08-167

SAMPLE ID 6E

FRACTION OIA TEST CODE OC 601 NAME EPA Method 601/GC

Date & Time Collected not specified

Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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Analytical Serv Results by Sample

LAB # 84-08-167

PAGE 5 RECEIVED: 08/16/84

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REPORT

LAB # 84-08-167 Continued From Above

SAMPLE 10 6F

FRACTION OZA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{vg/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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Analytical Serv REPORT Results by Sample

LAB # 84-08-167

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SAMPLE 10 7C, 8/14	#	FRAC	FRACTION O3A TEST CODE Date & Time Collected not		GC 601 NAME EPA Method 601/GC specified Category	
DATA FILECONC. FACTOR	∀	DATE INJECTED	08/23/84	ANALYST INSTRUMENT	. MCL VERIFIED BY	87 <u>456</u> TED <u>0</u>
SCAN	COME	сомРоимв	RESULT	SCAN	сомРасив	RESULT
		Chloromethane	QN		Trichloroethene	ÜN
		Bromomethane		The second secon	Dibromochloromethane *	ÜN
		Vingl Chloride	Q .		1, 1, 2-Trichloroethane *	N
		Chloroethane	Q a		cis-1,3-Dichloropropene *	N
	Meth	Methylene Chloride	ON O	***************************************	2-Chloroethylvinyl Ether	ND
H-	Trichlor	Trichlorofluoromethane	GN GN		Bromoform	ÜN
187	 	1,1-Bichloroethene	QN		1,1,2,2-Tetrachloroethane #	N
	!	1, 1-Dichloroethane	QN	eess on the second	retrachloroethylene #	ND
***************************************	trans-1, 2-	trans-1,2-Bichloroethene	GN .		Chlorobenzene	Q
		Chloroform	GN	And the second s	1,3-Bichlorobenzene	N
•	1, 2-	1,2-Bichloroethane	DN I	West open designations and	1,2-Dichlorobenzene	9
	1,1,1-1	1, 1, 1-Trichloroethane	QN	***************************************	1, 4-Dichlorobenzene	Q
	Carbon	Carbon Tetrachloride	QN			
	Bromod	Bromodichloromethane	QN			
	1,2-D	1,2-Dichloropropane	QN			
	trans-1,3-B	trans-1,3-Dichloropropene				

PAGE 7 RECEIVED: 08/16/84

Results by Sample Analytical Serv

REPORT

Continued From Above LAB # 84-08-167

SAMPLE 10 7C, 8/14

FRACTION O3A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

H-188

CORPORATION PAGE 8 RECEIVED: 08/16/84

REPORT Analytical Serv

LAB # 84-08-167

Results by Sample

TEST CODE GC 601 NAME EPA Method 601/GC FRACTION 04A

080 0 (n Ÿ Z Z K Z Ž ij RESULT ÿ Ÿ Ž ÿ 2 COMPOUNDS DETECTED VERIFIED BY Trichloroethene 2-Chloroethylvinyl Ether Bromoform Chlorobenzene 1, 3-Dichlorobenzene 1, 2-Bichlorobenzene 1, 4-Dichlorobenzene Dibromochloromethane cis-1, 3-Dichloropropene 1, 1, 2-Trichloroethane 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene Category COMPOUND 3CF e Date & Time Collected not specified ANALYST INSTRUMENT SCAN DATE INJECTED 08/23/84 g 9 2 9 S C) S RESULT O. g O O 9 2 Ŷ 물 Ž Ö Chloromethane Bromomethane Vingl Chloride Chloroethane Methylene Chloride Trichlorofluoromethane 1, 1-Dichloroethene 1, 1-Bichloroethane Chloroform trans-1, 2-Dichloroethene 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodichloromethane 1,2-Dichloropropane trans-1, 3-Dichloropropene COMPOUND K. SAMPLE 10 7A DATA FILE CONC. FACTOR SCAN H-189

CORPORATION RECEIVED: 08/16/84

Results by Sample Analytical Serv

REPORT

LAB # 84-08-167 Continued From Above

SAMPLE ID 7A

FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC Date % Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>vg/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

RECEIVED: 08/16/84

LAB # 84-08-167

REPORT

Analytical Serv

Results by Sample

VERIFIED BY COMPOUNDS DETECTED Trichloroethene Bromoform 2-Chloroethylvinyl Ether Chlorobenzene 1, 3-Dichlorobenzene 1, 4-Dichlorobenzene 1,2-Dichlorobenzene FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC Dibromochloromethane cis-1, 3-Dichloropropene 1, 1, 2-Trichloroethane 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene Category COMPOUND MCL Date & Time Collected not specified ANALYST INSTRUMENT SCAN DATE INJECTED 08/23/84 물 2 Ŝ ğ S S 일 g ĝ RESULT Ż 2 2 Ÿ 2 Chloromethane Bromomethane Vingl Chloride Chloroethane Methylene Chloride Trichlorofluoromethane 1,1-Bichloroethane Chloroform 1, 1-Dichloroethene trans-1, 2-Bichloroethene 1, 2-Bichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodichloromethane COMPOUND d. SAMPLE 10 7C, 8/15 DATA FILE CONC. FACTOR SCAN H-191

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trans-1, 3-Dichloropropene

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1,2-Dichloropropane

Analytical Serv

Results by Sample

LAB # 84-08-167 Continued From Above

SAMPLE 10 7C, 8/15

Category

FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE



APPENDIX I Correspondence with Federal, State and/or Local Regulatory Authorities [not used]



APPENDIX J
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- 12. U.S. Department of Agriculture, Soil Conservation Service, 1969, Soil Survey of Oklahoma County (Detailed Survey omits Tinker AFB).
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APPENDIX K

Biographies of Key Personnel

Thomas W. Grimshaw - Program Manager
William M. Little - Project Director
Lawrence N. French - Supervising Geologist
Robert C. Wallace - Pit and Tank Surveying
David H. Gancarz - Sediment Sampling
Nancy P. Stein - Monitor Well sampling
Jill P. Rossi - Cartographer
Ann E. S.Clair - Technical Review



THOMAS W. GRIMSHAW

EDUCATION:

Ph.D., Geology, University of Texas at Austin, 1976.

M.S., Geology, University of Texas at Austin, 1970.

B.S., Geological Engineering, South Dakota School of Mines and Technology, 1967.

EXPERIENCE:

Division Manager, Policy and Environmental Analysis Division, Radian Corporation, Austin, TX, 1982-Present.

Department Head, Environmental Analysis Department, Radian Corporation, 1978-1982.

Group Leader, Radian Corporation, 1976-1978.

Teaching Assistant, The University of Texas at Austin, 1974.

Captain (R&D Coordinator), U.S. Army, 1970-1972.

Geologist, Junior Grade, Amoco Production Company, 1969-1970.

Geologic Field Assistant, Amoco Production Company, 1967.

Certification: AIPG Certified Professional Geologist No. 4425

FIELDS OF EXPERIENCE:

Dr. Grimshaw has served in a technical and management role in numerous programs at Radian. Most recently, he has been the Technical Coordinator for several survey programs for Environmental Impairment Liability insurance applications. He has also performed or participated in several surveys, including a hazardous waste disposal site, large wastewater treatment plants, pulp and paper mills, aluminum forging and extrusion plants, and a large sanitary landfill.

Dr. Grimshaw is currently acting as Program Manager for two programs for site investigation and remedial action planning for solid/hazardous waste disposal and related activities at installations of the U.S. Air Force. These programs are being conducted at bases in Texas and Louisiana as part of the Air Force's Installation Restoration Program.

In recent months, Dr. Grimshaw has been the Technical Coordinator for a large program being conducted by a major paper company to develop Closure Plans for



impoundments at wood treatment plants in three states. This program included a full complement of studies to define the existing situation and prepare a plan of remedial action for each plant. The initial activity was the sampling and analysis of pond supernatant and sludge, subsoil, and ground water. Bench-scale stabilization studies were performed on the sludge using a number of candidate commercial stabilizing compounds. Several closure alternatives were developed and screened, and a set of alternatives was selected for inclusion in conceptual plans. After the conceptual plans were approved by the client and the regulatory agency, a detailed design was prepared and specifications developed.

For Tuloma Energies, Inc., Radian performed a program directed by Dr. Grimshaw for development of a commercial Hazardous Waste Management Facility in northeastern Oklahoma. During the initial phases of this project, a market analysis was performed to determine the sources at waste that could potentially use the new facility. Subsequently, a regional screening analysis was performed to identify areas most likely to have suitable sites for the new facility. This analysis included screening for several factors, including hydrologic, geologic, topographic, ecologic, and aerometric characteristics as well as population density. Dr. Grimshaw assisted Tuloma Energies in coordinating with the state regulatory agency (Oklahoma Department of Health) during the initial phases of the project. The project is currently being held in abeyance pending improvement in the national economy.

Dr. Grimshaw was Project Director for two programs for a major paper company to evaluate the potential risk of proposed solid waste management plans for paper mills in Arkansas and Mississippi. These programs included collection of waste, soil, and ground-water samples, analysis of the wastes, and batch extraction of the wastes followed by analysis of the leachates. In addition, leachates were generated and attenuated in waste and soil columns to evaluate the capacity of the subsoil to attenuate any leachate that might escape from the disposal site. A ground-water flow model was used to assess the rate and direction of contaminant movement if contaminants were to reach the water table.

Dr. Grimshaw was Technical Director for a generic environmental assessment of wastes from fluidized bed combustion for the U.S. Environmental Protection Agency (EPA). Emphasis was placed on potential hydrologic impacts. Both laboratory studies and field lysimeter tests were conducted in the study. The objectives were to identify and investigate key variables which determine the acceptability of FBC waste disposal and to establish a reliable empirical correlation between laboratory and field results so that better conclusions on field effects can be drawn on the basis of laboratory studies. Provisions of the Resource Convervation and Recovery Act are allowed for in the investigation. Since the regulatory situation for FBC wastes was unclear during conduct of the program, provisions were made for both the eventuality that leachate migration will be allowed in the substrate below the landfill and that leachate escape will be controlled by liners. Interactions between



leachate and representative disposal media and between leachate and several candidate liner materials were investigated in laboratory studies.

Dr. Grimshaw was also Technical Director for a program to investigate the ground-water impact of a spill of a coal-distillate liquid fuel at an SRC-II (Solvent Refined Coal) pilot plant at Fort Lewis Military Reservation near Tacoma, Pierce County, Washington. The spill site was underlain by highly permeable soils with a water table aquifer at a depth of approximately 30 feet. The study involved detailed coring to establish the location and extent of unsaturated zone cotamination and designing and constructing a set of ground-water monitoring wells to define the extent of ground-water contamination that had occurred. Analytical chemistry support was provided for Resource Conservation and Recovery Act (RCRA) Extraction Procedure testing of contaminated soils and for ground-water quality evaluation. A Remedial Measures Plan was formulated and implemented to remove contaminated material and to prevent the further spread of ground-water contamination. Measures included partial excavation of contaminated soils and installation of production wells for ground-water flow control. This program involved extensive coordination and interfacing with the states regulatory authority (Washington Department of Ecology).

In a follow-up program for which Dr. Grimshaw was again Technical Director, Radian evaluated the overall hydrogeologic impact of the entire SRC plant in addition to the spill area. This program again involved soil sampling, extraction, and analysis as well as water quality monitor well installation and sampling. A zone of contamination was identified, and a comprehensive Remedial Measures Plan was prepared to address the problem.

In a program for Utah International, Incorporated, Dr. Grimshaw was responsible for evaluating the implications of RCRA on the company's mining operations under various regulatory scenarios. Special reference was made to UI's proposed Springer Mine which is in Pershing County, Nevada. Several issues concerning the application of RCRA regulations to metal mines emerged, including the following: (1) applicability of the procedure for classifying solid waste as hazardous or non-hazardous; (2) problems associated with applying disposal regulations to all operations; (3) difficulties in applying limited interim regulations pending development of final regulations; (4) integration of RCRA regulations with other regulations, especially the Clean Water Act; and (5) the appropriateness of certain specific provisions of the regulations such as flood plain definition, financial requirements, and monitoring requirements.

Dr. Grimshaw was Technical Director for the first phase of a project to investigate the environmental feasibility of disposing of flue gas desulfurization (FGD) wastes, ash and sludge, from a mine mouth power plant by backfilling into the associated surface mine in northwestern Colorado. He also had major supervisory and hydrogeologic interpretation roles in the second phase of the program, which included extensive field studies. These field studies included infiltration tests of the mine floor and overburden, water balance



investigations to estimate ground-water recharge, and emplacement of piezometers to ascertain the direction of ground-water flow. A major output of this program was a rating of the various parts of the large surface mine in terms of suitability for ash and sludge disposal.

Dr. Grimshaw was a Task Leader in a program for the EPA ground-water laboratory (Robert S. Kerr Environmental Research Laboratory) to investigate a technique for identifying sources of nitrate ions in ground waters and soils using stable nitrogen isotopes. The usefulness of nitrogen isotope ratios for differentiating sources of nitrate pollution (septic tanks, feedlots, barnyards, and lands receiving municipal waste waters) was evaluated. Soil samples were obtained both by surface augering and by deep boring and coring, and ground-water samples were collected from existing shallow wells. A total of 66 soil samples and contaminated ground waters were analyzed for nitrate, chloride, and for nitrate-nitrogen isotopic composition. Standard statistical techniques were used to analyze the observed variations in $\delta^{15}N$ values, with respect to several nitrate-ion sources and various environmental factors.

For a comprehensive environmental assessment for a proposed large lignite mine in Texas, Dr. Grimshaw prepared and conducted an aquifer test program. These efforts included design of the pump wells and piezometers, layout of the well configuration in the field, oversight of well drilling operations, conduct of the two pump tests, and interpretation of the results in terms of the basic aquifer parameters. In another program related to this mine, Dr. Grimshaw was responsible for evaluating the potential effects on ground water resulting from disposal of ash and FGD solids from a power plant by emplacement of the wastes in the mine.

Prior to his employment by Radian Corporation, Dr. Grimshaw was employed as an oil and gas exploration geologist by Amoco Production Company, Denver, Colorado. Initially, he was a geologic field assistant near the coast of the Gulf of Alaska. This work entailed measuring, describing, and collecting stratigraphic sections in the Tertiary rocks in the vicinity of Cordova and Cape Yakataga, Alaska. Subsequently, Dr. Grimshaw was involved in a gas and petroleum exploration program in northcentral Montana. Most of the effort was in working out the stratigraphy and structural geology in the area of investigation, and he served for a time as well-site geologist on gas exploration wells. In addition, he launched a program of regional exploration in a much larger area in Montana. This work included study of down-hole geophysical logs, preparation of structural contour maps, and assembly of isopachous maps.

HONORARY AND PROFESSIONAL SOCIETIES:

Sigma Xi, Phi Kappa Phi, Sigma Tau, Sigma Gamma Epsilon, Geological Society of America, American Association of Petroleum Geologists, Association of Engineering Geologists.



PUBLICATIONS/REPORTS: \(\(^{\text{N}}\)

Grimshaw, T.W. and W.M. Little, "Remedial Measures Plan for a Spill of Solvent Refined Coal Liquid at the SRC Pilot Plant, Ft. Lewis, Washington," Radian Corporation, Austin, TX, August 1980.

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Holland, W.F., et al., "Environmental Impact Statement for the Greensboro, Guilford County, North Carolina, 201 Wastewater Treatment System (Draft and Final EIS)," Radian Corporation, Austin, TX, September 1977.



WILLIAM M. LITTLE

EDUCATION:

- M.S., Civil Engineering, University of California, Berkeley, 1974.
- M.S., Hydrology, University of Arizona, Tucson, 1968.
- B.S., Hydrology, University of Arizona, Tucson, 1967.

EXPERIENCE:

Senior Engineer and Group Leader, Radian Corporation, Austin, TX, 1982-Present.

Senior Engineer, Radian Corporation, Austin, TX, 1978-1982.

Hydrologist, U.S. Army Environmental Hygiene Agency, 1973-1978.

Research and Technical Operations Officer, U.S. Army Engineer Nuclear Cratering Group, 1969-1971.

Graduate Student in Research, University of Arizona, Tucson, 1968.

FIELDS OF EXPERIENCE:

Mr. Little is a Senior Engineer and Group Leader with a major technical specialty in ground-water pollution studies. He is currently the Project Director for hydrogeologic investigations of multiple waste disposal sites on Kelly Air Force Base, Texas, and Tinker Air Force Base, Oklahoma. These investigations include monitoring well construction, ground-water sampling, and contaminant transport assessment. He is responsible for program design and execution, subcontractor selection, and managing and editing the final report. He has recently completed a hydrogeologic investigation of a Superfund site in western New York state. The project included monitoring well construction, definition of ground-water flow system, assessment of contaminant transport potential, and presentations to regulatory authorities. Mr. Little served as Project Director and principal investigator.

He has served as Project Director and field manager for a large, multidisciplinary characterization of an abandoned hazardous waste disposal site in southern California. The waste materials consist of acid petroleum refinery sludges. Major areas of investigation were: chemical characterization of wastes and geologic materials; quantification of sulfur dioxide and hydrocarbon emissions; and ground-water monitoring. Mr. Little was responsible for managing the field operations and supervising report preparation.

Mr. Little has served as assistant Project Director and field manager for an investigation of the ground-water quality impact of a spill of a coal-distillate liquid at an SRC pilot plant near Tacoma, Washington. The study involved



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detailed unsaturated zone coring and designing and constructing a series of ground-water monitoring wells A Remedial Measures Plan was formulated and adopted to remove contaminated materials and to prevent the further spread of ground-water contamination. Following the evaluation of the spill event, Mr. Little directed an expanded program to evaluate the ground-water quality effects of overall plant operations. The possible sources of contamination were identified and characterized. Mr. Little then developed a ground-water monitoring program and supervised the installation of the monitoring network. He designed and conducted aquifer pump tests to define aquifer performance and interpreted the results.

Mr. Little has also conducted a program to evaluate the extent of ground-water contamination by refinery operations and wastes at an oil refinery near Duncan, Oklahoma. The initial assessment was based on site reconnaissance, interviews with refinery personnel and a study of existing hydrogeologic and process data.

Mr. Little has recently completed two environmental/regulatory fatal flaw studies for lignite mines and associated power plants in East Texas. He was both Project Director, responsible for overall management and preparation of the final report, and hydrology task leader, responsible for assembling data on hydrologic conditions and assessing probable impacts. He has also recently served as task leader for regulations review, impact analysis and permit application preparation for a commercial-scale coal gasification facility in Wyoming and ground-water hydrology task leader for environmental analysis of a major lignite mine and associated synfuels plant in east Texas.

In another program, Mr. Little directed an evaluation of surface-water and ground-water availability in the vicinity of the proposed Solvent Refined Coal-II (SRC-II) demonstration plant and commercial facilities near Morgantown, West Virginia.

For a private industrial client, Mr. Little reviewed and evaluated the environmental monitoring data from the vicinity of an in situ coal gasification test in the Powder River Basin of Wyoming. The water quality impacts of the test burn were assessed, and a program of aquifer restoration and hydrologic testing recommended. Based on available hydrologic and geochemical data, a conceptual model of the test site was developed. He also developed a ground-water monitoring and contingency aquifer restoration program for a proposed future test. The program includes selection of well locations and parameters for monitoring and specification of restoration strategies.

Mr. Little has also participated in an assessment of the environmental behavior of fluidized bed combustion (FBC) waste for EPA, IERL. Mr. Little was responsible for the design, construction and operation of field cells for testing FBC waste disposal alternatives and for the development of a preliminary waste transport model. He has also been project director and hydrology

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task leader in the evaluation of the environmental suitability of an ash/ scrubber sludge disposal site. He was responsible for the overall management of the program, evaluated the laboratory and hydrogeologic data and predicted contaminant migration.

As a hydrologist with the Water Quality Engineering Division, U.S. Army Environmental Hygiene Agency, Mr. Little served as a consultant to the Office of the Surgeon General and to major commands and installations on hydrologic aspects of water supply and wastewater disposal. He prepared design criteria for programs of effluent and receiving water monitoring at Army manufacturing and research facilities, evaluated ground-water pollution potential of waste disposal practices, and reviewed draft NPDES discharge permits issued to Army installations. He performed preliminary technical feasibility studies of land treatment of wastewater including field investigations and trial systems design. He conducted environmental impact statement data requirements review and prepared and reviewed portions of environmental impact statements. Mr. Little also managed the Army Medical Department's nationwide Drinking Water Surveillance Program.

With the Corps of Engineers, Mr. Little was assigned as a Research and Technical Operations Officer, U.S. Army Engineer Nuclear Cratering Group. There he conducted a general investigation of hydrologic transport of radionuclides from Plowshare application sites. This work included literature searches, computer simulation, experimental design and conceptual modeling of transport phenomena. He also participated in final preparation of a 1971 Corps of Engineers report on Wastewater Management in the San Francisco Bay Region.

While at the University of Arizona, Mr. Little was a member of the Operations Research Study Group on the Tucson Basin, gathering background hydrologic material, and conducting a literature and data file search. He directed and participated in preliminary adaptation of a two-dimensional, finite difference model of a large, heterogeneous ground-water basin.

HONORARY AND PROFESSIONAL SOCIETIES:

American Geophysical Union, American Water Resources Association, National Water Well Association, Sigma Xi.

CERTIFICATION:

AIPG Certified Professional Geological Scientist No. 6468.

PUBLICATIONS/REPORTS:

Numerous technical reports in the fields of water resources development, ground-water contaminant migration, occurrence of radionuclides in ground water, land treatment feasibility and receiving water monitoring, including:

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William M. Little

Little, W.M., "Hydrogeologic Investigations, Facet Enterprises, Inc., Elmira, New York," Radian Corporation Final Report to Facet Enterprises, Inc., September 1983.

Little, W.M., et al., "McColl Site Investigation - Phase 1," Radian Corporation Report to the Participants Committee, November 1982.

Little, W.M., et al., "Environmental Considerations and Air Quality Modeling for the Freestone County Project," Radian Corporation Report to Tenneco Coal Company, March 1982.

Grimshaw, T.W., et al., "Assessment of Fluidized-Bed Combustion Solid Wastes for Land Disposal," Draft Final Report, Radian Corporation Report to EPA Industrial Environmental Research Laboratory, December 1982.

Little, W.M., et al., "Environmental Considerations and Air Quality Modeling for the Edgewood and Mustang Creek Prospects and Associated Energy Park," Radian Corporation Report to Tenneco Coal Company, November 1981.

Little, W.M., et al., "Ground-Water Impact of SRC Pilot Plant Activities Fort Lewis, Washington," Radian Corporation report to Gulf Mineral Resources Company, January 1981.

Little, W.M., et al., "Ground Water Modeling at an In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, September 1980.

Little, W.M. and H.J. Williamson, "Recommended Ground-Water Monitoring and Aquifer Restoration Programs, Future In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, September 1980.

Little, W.M. and W.C. Micheletti, "Recommended Aquifer Restoration and Hydrologic Testing Program for an In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, August 1980.

Grimshaw, T.W. and W.M. Little, "Remedial Measures Plan for a Spill of Solvent Refined Coal Liquid at the SRC Pilot Plant, Fort Lewis, Washington," Radian Corporation Report to Gulf Mineral Resources Company, August 1980.

Little, W.M., et al., "Hydrologic Evaluation of a Combined Ash/FGD Sludge Storage Site, Craig Station," Radian Corporation Report to Colorado Ute Electric Association, July 1980.

Little, W.M., T.J. Wolterink, and M.H. McCloskey, "Water Availability Appraisal for the Proposed Solvent Refined Coal-II Demonstration Plant, Monongalia County, West Virginia," Radian Corporation Report to U.S. Department of Energy, February 1980.

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William M. Little

Little, W.M., "Water Quality Geohydrologic Consultation No. 24-0286-77," Twin Cities Army Ammunition Plant, New Brighton, MN, 21-23 July 1976, U.S. Army Environmental Hygiene Agency, 11 January 1977 (six additional geohydrologic consultations; sole author on two, senior on three, junior on one).

Little, W.M., Drinking Water Consultation Visit No. 24-1301-77, Joliet Army Ammunition Plant, Illinois, 2-4 August 1976, USAEHA, 9 February 1977 (four additional drinking water consultations).

Little, W.M., Water Quality Geohydrologic Consultation No. 24-058-75/76, Land Disposal Feasibility Study, Fort Polk, Louisiana, 2-29 April and 9-29 October 1975, USAEHA, 19 August 1976.

Little, W.M., Water Quality Geohydrologic Consultation No. 24-005-76, Land Disposal Feasibility Study, Fort Dix, New Jersey, 21-30 July and 15-23 September 1975, USAEHA, 18 June 1976 (two additional land treatment evaluations as part of water quality engineering special studies).

Little, W.M., Water Quality Monitoring Consultation No. 24-048-74/75, Aberdeen Proving Ground, Maryland, 25-27 February 1974, USAEHA, 17 December 1974 (three additional monitoring consultations).

Little, W.M., Water Quality Engineering Special Study No. 24-017-74, Mixing in Receiving Waters, 7 September-24 October 1973, USAEHA, 3 January 1974.

Little, W.M., Analysis of Hydrologic Transport of Tritium, U.S. Army Engineer Nuclear Cratering Group Technical Memorandum 70-7, Lawrence Radiation Laboratory, Livermore, CA, April 1971.

Little, W.M., An Engineering and Economic Feasibility Study for Diversion of Central Arizona Project Waters from Alternate Sites, M.S. Thesis, Department of Hydrology, University of Arizona, Tucson, AZ, 1968.



LAWRENCE N. FRENCH

EDUCATION:

M.A., Geological Sciences, University of Texas at Austin. 1979.

B.S., Geological Sciences, University of California at Riverside, 1975.

EXPERIENCE:

Group Leader, Radian Corporation, Austin, TX, 1982-Present.

Staff Geologist, Radian Corporation, Austin, TX, 1979-Present.

Geologist, Sargent and Lundy Engineers, Chicago, IL, 1978-1979.

Teaching Assistant, University of Texas at Austin, 1975-1976.

FIELDS OF EXPERIENCE:

At Radian, Mr. French is involved in a variety of hydrogeologic and geologic studies. His roles in these studies range from collecting and analyzing hydrogeologic data, interpreting and reporting results of investigations, to directing interdisciplinary programs.

Mr. French has been involved in various aspects of ground-water investigations at several hazardous waste disposal sites. He recently served as Project Director for a study of PCB-contaminated soils at an industrial site in North Texas. The study involved sampling and analysis of near-surface soils to define the extent of PCB contamination. Remedial measures options were also identified. Mr. French also developed a ground-water monitoring plan in accordance with the Compliance Agreement between the state and the property owner. As Ground-Water Task Leader, he supervised the installation of monitoring wells at an abandoned petroleum products waste dump in Southern California. This effort involved collection and logging of soil samples and collection of water samples for chemical analysis. He later co-authored a technical report on the occurrence and character of ground water at the site. As Radian's involvement in the investigation continued, Mr. French prepared technical designs and specifications for a permanent, post-remedial action ground-water monitoring network. Mr. French has also been responsible for field activities related to the USAF Installation Restoration Program at Tinker AFB, Oklahoma. At Tinker, electromagnetics surveys were performed at closed industrial waste impoundments and monitoring wells were installed near landfills. At England AFB, Louisiana, Mr. French developed a work plan for the evaluation of waste disposal practices at the base.

As part of a comprehensive hydrogeologic evaluation of a solvent refined coal pilot plant in Washington, Mr. French supervised the installation of water quality monitoring wells and conducted pumping tests for the evaluation of



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aquifer characteristics. He also supervised soil coring and sampling efforts at the site of process fluid spill. Mr. French also served as Project Director for a pre-closure evaluation of two hazardous waste impoundments at a wood treatment plant in Washington. The plant had discharged wastewater containing creosote and pentachlorophenol to the unlined impoundments, which are located on floodplain sands and gravels of the Columbia River. A second site was also examined in terms of disposal practices and the character and volume of wastes. Results of the pre-closure survey were used for a definition of areas of concern requiring closure and for the selection of ground-water monitoring parameters based on the character and volume of wastes.

Mr. French has participated in several ground-water studies for Western coal mining programs. For a large surface mine in New Mexico, he was a principal author of the cumulative hydrologic impat assessment conducted for the Office of Surface Mining. Principal hydrologic concerns for individual mines were identified and compared to predicted hydrologic impacts in order to determine if material damage would result from mining. For a proposed commercial underground coal gasification project, Mr. French was involved in the conceptual design of an aquifer restoration program. Ground water would be withdrawn from the burn cavity, treated at the surface, and reinjected into the coal seam. As Task Leader for both geology and ground-water hydrology tasks for a feasibility study of a proposed lignite gasification facility, Mr. French investigated waste disposal and ground-water supply issues. In addition, Mr. French examined the feasibility of a deep well injection system for the disposal of process wastewaters. This initial evaluation included the identification and characterization of possible injection zones, formation water chemistry, probable injection rates and pressures, and subsurface migration of waste fluids.

As a Project Director on a quick-response effort for the Department of Energy, Division of Fossil Fuel Processing, Mr. French evaluated the water availability for a proposed solvent refined coal demonstration plant in northwestern Kentucky. This project consisted of a comprehensive appraisal of existing and future water supplies, demands, and policies that affect water availability in the vicinity of the demonstration plant.

While employed by Sargent and Lundy Engineers, Mr. French was involved in detailed hydrologic and geologic studies for Preliminary and Final Safety Analysis Reports (PSAR and FSAR) for several nuclear power plants. The PSARs and FSARs involved detailed geologic mapping, inventory of water wells, analysis of subsurface flow, and reviews of regional geologic features. In a study conducted with the Illinois and Indiana Geological Surveys, Mr. French analyzed stratigraphic, structural, and hydrologic features at sites in the Illinois Basin for a compressed air energy storage project. Mr. French directed an extensive hydrogeologic and geologic study of potential sites for a lignite-fired electric generation station in Walker County, Texas. Mr. French also conducted the field program for an engineering soils exploration



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effort at a construction site for a lignite-fired power plant in Harrison County, Texas.

Mr. French supervised several field programs at Sargent and Lundy. These programs included: construction and testing of two industrial water wells near Cincinnati; installation and testing of pneumatic piezometers at a nuclear power plant excavation in northern Indiana; and aquifer testing and analysis of hydraulic characteristics of the alluvial-glacial outwash aquifer near Wausau, Wisconsin.

HONORARY AND PROFESSIONAL SOCIETIES:

American Institute of Professional Geologists, CPGS No. 6307; California Registered Geologist No. 3804; Ground-Water Technology Division of the National Water Well Association; Geological Society of America.

PUBLICATIONS/REPORTS:

French, L.N. and J.L. Machin, "Cumulative Hydrologic Impact Assessment for McKinley Mine," Radian Corporation, Austin, TX, January 1984.

Little, W.M. and L.N. French, "Hydrogeologic Aspects of the McColl Site, Fullerton, California," Radian Corporation, Austin, TX, November 1982.

French, L.N., "Pre-Closure Evaluation of the Treated Wood Products Facility and Site C, Longview, Washington," Radian Corporation, Austin, TX, May 1983.

Lacy, J.C., L.N. French, and T.W. Grimshaw, "Regulation of the Hydrologic Impacts of Underground Coal Gasification," in Proc. Sixth Underground Coal Conversion Symposium, Shangri-La, OK, pp. V-79 thru V-88, July 1980.

French, L.N., et al., "Environmental Constraint Analysis of the Proposed Coastal Bend Coal Gasification Project," Radian Corporation, Austin, TX, August 1981.

White, D.M. and L.N. French, "Evaluation, Screening, and Prioritization of Candidate Gulf Coast Lignite Resource Blocks," Radian Corporation, Austin, TX, April 1981.

French, L.N. and J.L. Machin, "Water Availability Appraisal for the Proposed Solvent Refined Coal-I Demonstration Plant, Daviess County, Kentucky," Radian Corporation, Austin, TX, December 1979.

U.S. Bureau of Land Management, "Proposed Camp Swift Lignite Leasing (Draft and Final EIS)," Radian Corporation, Austin, TX, September 1980.



Lawrence N. French

French, L.N., "Compilation of Environmental Information for a Proposed Olefins Complex, Brazoria County, Texas," Radian Corporation, Austin, TX, July 1981 (author of Ground-Water Hydrology and Topography and Geology chapters).

Skinner, F.D., L.N. French, and D.E. Pusch, "Regulatory Review and Estimated Costs for a Proposed In-Situ Gasification Facility," Radian Corporation, Austin, TX, April 1982.



ROBERT C. WALLACE

EDUCATION:

Master of Engineering, Environmental Engineering, (Minor, Coastal and Oceanographic Engineering), University of Florida, Gainesville, FL, 1980.

Graduate Studies in Statistics, Florida State University, Tallahassee, FL, 1977.

B.A., Environmental Science, University of Virginia, Charlottesville, VA, 1971.

EXPERIENCE:

Staff Engineer, Radian Corporation, Austin, TX, 1981-Present.

Environmental Engineer, Radian Corporation, Austin, TX, 1980-1981.

Graduate Research Assistant, Water Resources Research Center, University of Florida, 1977-1980.

Lieutenant, United States Navy, 1971-1976.

FIELDS OF EXPERIENCE:

While at Radian, Mr. Wallace pursues engineering solutions to environmental problems and issues for both private industry and government clients. His experience and training includes both operational management and engineering research and development roles. His primary research interests at Radian include hydrologic investigations, transport processes in natural systems, and evaluation of alternative waste management treatment systems for energy industries.

Mr. Wallace is participating in the preparation of RCRA part B applications for a variety of clients who operate hazardous waste treatment, storage, or disposal facilities. These include two major petroleum refineries, a new hazardous waste incinerator at a major chemical manufacturing facility, and a research and development facility for a new PCB thermal destruction process. Mr. Wallace has been involved in all phases of the requirements for a RCRA permit incuding incinerator and land treatment demonstrations, liner compatibility testing, ground water investigations, and facility management plans.

Mr. Wallace was the project director of a study of wastewater treatment alternatives available to a major Midwest refinery which had been unble to consistently meet its NPDES discharge limitatinos. The study included a survey of the literature and screening of control technologies for

feasibility and cost considerations. A series of alternatives were developed and the impact of these alternatives in terms of cost and effectiveness evaluated.

At Radian, Mr. Wallace has served as the project director for a number of programs related to the feasibility, environmental acceptability, and permitting strategy for major new energy facilities. This work includes: a stormwater management study for a major oil refinery in the midwest, a feasibility study for a proposed coal gasification plant that included separate studies on site selection, environmental assessment, regulatory analysis, and CPM schedule preparation; several programs to provide all permitting support to proposed natural gas-fired cogeneration power plants to be situated adjacent to major energy or chemical facilities; environmental analysis of noise impacts on nearby communities and wildlife from two large energy plants, one in Kentucky and one in North Texas; hydrologic analysis of the impacts of the discharge of lignite mine depressurization waters to four small creeks in Central Texas; a comparative analysis of the environmental impacts of industrial lignite utilization via direct firing versus medium Btu gasification; a technical review of alternative stormwater management/treatment alternatives for the solvent refined coal (SRC) pilot plant in Fort Lewis, Washington. nd

Mr. Wallace is currently involved in the conduct of environmental surveys of private facilities in support of the risk assessment exercise required by the underwriters of Environmental Impairment Liability Insurance. The survey consists of applicant interviews and facility site visits to assess the level of environmental concern and conduct, particularly in the area of waste handling and disposal practices. Facility surveys have included a hazardous waste treatment and disposal site, a multi-facility metal fabrication manufacturing concern, a diversified high technology corporation, a major airline, and a nuclear power plant construction site.

Mr. Wallace evaluated the air and water environmental impacts of alternative remedial actions proposed for the Superfund clean-up of the Lipari landfill in Pittman, New Jersey. At this site a variety of synthetic organic chemicals were leaching into an urban watershed. In order to predict the fate of individual chemicals, Mr. Wallace employed an environmental fate (Fugacity) model to examine the partitioning behavior of the chemicals leaching into the watercourse and lake downstream from the landfill. This analysis demonstrated that although most of the chemicals were volatile, two substances Bis 2(chloroethyl)ether and Bis 2(chloroethoxy)ethane were soluble enough to be found in the stream and lake downstream.

In Fullerton, California, at the McColl Superfund site, Mr. Wallace evaluated the odor impacts of various alternative clean-up options being considered. In this effort, he exercised a calibrated odor prediction model for evaluating removal options involving site disturbance. This model strongly indicated that even small disturbances of the site (by earth-moving equipment) would produce large odor impacts in nearby residential areas.

As a research assistant at the University of Florida, Mr. Wallace investigated the hydrology of cypress wetlands to assess their potential for use as water management areas for secondary sewage effluent recycling. This long-term study was under the auspices of the Rockefeller Foundation and the RANN Division of the National Science Foundation. His specific research task was to quantify the surface—water budget. This included measurement and analysis of basin geometry; flow rate determination from analysis of level records; and development of a mathematical prediction model for surface outflow.

Mr. Wallace studied under an EPA-funded program to collect from all sources urban rainfall-runoff-quality data for use in modeling and for characterization of urban stormwater runoff. This data base includes records of over a thousand rainstorms from 85 different catchments in urban areas all over North America. In this effort, Mr. Wallace contributed to the design of the data structure and developed the software programs to access, analyze, and display the data. As part of his Master's research project, he examined the relationship between stormwater quality loadings and precipitation characteristics.

While in the Navy, Mr. Wallace was assigned to several service ships of the U.S. Atlantic Fleet that performed a wide range of ocean engineering tasks including diving operations, oil pollution control, ship and aircraft salvage, and search and rescue throughout the Atlantic and Mediterranean.

PUBLICATIONS:

"Statistical Modeling of Water Quality Parameters in Urban Runoff," Master's Project, University of Florida, 1980.

Surface Water in "Cypress Wetlands for Water Management, Recycling, and Conservation," Final Report to National Science Foundation, Center for the Wetlands, University of Florida, 1980.

"Review of Alternative Stormwater Treatment Systems for the Solvent Refined Coal (SRC) Pilot Plant, Fort Lewis, Washington," Technical Memorandum, Radian Corporation, Austin, TX, 1980.

Environmental Noise - in "An Environmental Assessment for a Geothermal Direct Utilization Project in Reno, Nevada," Radian Corporation, Austin, TX, 1980.

Surface Water and Noise - in "Environmental Report: Combustion Engineering/Gulf States Utilities Company Fuel Gas Demonstration Plant, West Lake, Louisiana," Radian Corporation, Austin, TX, September 1981.

"Analysis of the Impacts of Mine Depressurization Discharges from the Milam Mine," Technical Memorandum, Radian Corporation, Austin, TX, March 1982.

"Preliminary Site Screening Studies: Celanese East Texas Project Final Report, for Task 2 and 3," Radian Corporation, Austin, TX, May 1981.

"Air Quality Siting Constraints in Robertson and Shelby Counties, Texas," Technical Memorandum, Radian Corporation, Austin, TX, July 1981.

"Environmental Screening of Candidate Sites in Brazoria, Robertson, and Shelby Counties," Final Report for Tasks 4 and 5, Radian Corporation, Austin, TX, October 1981.

"Regulatory Compliance Schedule for Environmental Licensing of a Coal Gasification Facility in Texas," Final Report for Task 7, Radian Corporation, Austin, TX, October 1981.

Noise in - "Environmental Information Document for a Proposed Lignite Beneficiation Plant Demonstration Project, Robertson County, Texas," Radian Corporation, Austin, TX, May 1981.

"Problems and Issues Related to Surface-Water Quality Regulation," Report to the Department of Energy, Radian Corporation, Austin, TX, July 1981.

Noise and odor Chapters in - "Compilation of Environmental Information for Tri-State Synfuels Project," Radian Corporation, Austin, TX, September 1981.

"Environmental Assessment of Air Quality, Surface Water, and Noise Impacts for the Proposed Milam Mine," Radian Corporation, Austin, TX, July 1982.

Surface Water Controls in - "Evaluating Cost-Effectiveness of Remedial Actions at Uncontrolled Hazardous Waste Sites," Draft Methodology Manual, Radian Corporation, Austin, TX, January 1983.

Surface Water and Air Ouality in - "Draft Environmental Information Document for Remedial Actions at the Lipari Landfill, Pitman, New Jersey," Radian Corporation, Austin, TX, October 1982.

Environmental Fate in - "Development of a Monitoring Program to Evaluate the Effect of Remedial Actions at the Lipari Landfill on Alcyon Lake, Pitman, New Jersey," Radian Corporation, Austin, TX, January 1983.

"Interim Task Report: Noise and Odor, Texas Gasification Project," Technical Report, Radian Corporation, Austin, TX, January 1983.

Closure, Contingency, and Training Plans in - "Hazardous Waste Incinerator, Industrial Hazardous Waste Part B Permit Application," Radian Corporation, Austin, TX, January 1983.

"Audible Noise Measurements from an Electric Transmission Line near Weimar, Texas," Technical Note, Radian Corporation, Austin, TX, March 1982.

"Noise Assessment for a Proposed Snack Food Manufacturing Facility in Kern County, California," Radian Corporation, Austin, TX, October 1982.

Surface Water in - "Site Evaluation and Regional Screening Analysis for the Tuloma Waste Management Facility," Radian Corporation, Austin, TX, February 1982.

PRESENTATIONS:

"Gasification vs. Direct Firing of Lignite: An Environmental Comparison," Paper presented at American Water Resources Association Symposium on Water for Energy, Houston, TX, December 1980.

"Permitting of a Hazardous Waste Incineration Facility in Northern California," Presentation to the Peninsula Industrial and Business Association Symposium on Practical Alternatives to the Land Disposal of Hazardous Wastes, Palo Alto, CA, June 1982.



DAVID H. GANCARZ

EDUCATION:

Master of Engineering, Environmental Engineering (Hydrology), University of Florida, Gainesville, FL, 1984.

Bachelor of Arts, Grinnell College, Grinnell, IA, 1976.

EXPERIENCE:

Engineer, Radian Corporation, Austin, TX, 1984-Present.

Graduate Research Assistant, Department of Environmental Engineering, University of Florida, Gainesville, FL, 1983-1984.

Chemist I, Department of Food Science & Human Nutrition, University of Florida, Gainesville, FL, 1981-1982.

Laboratory Technologist I, Department of Soil Science and Department of Fruit Crops, University of Florida, Gainesville, FL, 1977-1981.

Graduate Teaching Assistant, Department of Botany, University of Florida, Gainesville, FL, 1976-1977.

FIELDS OF EXPERIENCE:

As an Engineer at Radian, Mr. Gancarz has been involved with the final preparation of an atmospheric modeling study for the EPA using STRATOS. Mathematical manipulations of the model output as well as graphical presentation were performed on the IBM PC using Lotus 1-2-3.

As a Graduate Research Assistant, Mr. Gancarz was responsible for researching and writing a thorough literature review of the sources, effects, and regulations concerning ambient air flourides for the Florida Department of Environmental Regulation. A later project under the South West Florida Water Management District involved a study of the surface and subsurface hydrology around a 150 MGD wellfield in central Florida. The focus of the project was a modeling effort using the hydrologic models HSPF and PLASM.

His graduate research was an adaptation of the Storage/Treatment block of the widely used urban stormwater runoff model SWMM to microcomputer. A consequence of this research is proficiency with MS DOS, Apple DOS, Apple PASCAL, CP/M, and the FORTRAN compilers F-80 by Microsoft and IBM PC FORTRAN by Microsoft.

Prior to his return to graduate school, Mr. Gancarz conducted analyses of pesticide residues in soil and tissue samples for the Institute of Food and Agricultural Sciences at the University of Florida. Various phases of this

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David H. Gancarz

work involved sample preparation, gas chromatographic analysis, and radioisotope tracer techniques. While at the Department of Fruit Crops at the University of Florida, Mr. Gancarz developed an efficient assay for cellulase isozymes in citrus.

PUBLICATIONS:

Gancarz, D.H. and W.C. Huber, "The USEPA Storm Water Management Model Storage/Treatment Block for the IBM Personal Computer," Paper to be presented at the Storm Water & Water Quality Model Users Group Conference, Hamilton, Ontario, Canada, 1984 (in preparation).

Gancarz, D.H., et al., "Ambient Atmospheric Fluoride Pollution in Florida," Report to State of Florida Department of Environmental Regulation, 1983.

Huber, W.C., D.H. Gancarz, and R.E. Dickinson, "Apple SWMM, a Possibility?" Proceedings of Conference on Emerging Computer Techniques in Stormwater Management, Ontario, Canada, 1983.

Ou, L.T., et al., "Infuence of Soil Temperature and Soil Moisture on Degradation and Metabolism of Carbofuran in Soils," <u>Journal of Environmental Quality</u>, 11:293-298, 1982.

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NANCY PACHARZINA STEIN

EDUCATION:

B.S., Engineering Science/Environmental Engineering, University of Texas at Austin, 1979.

EXPERIENCE:

Environmental Engineer, Radian Corporation, Austin, TX, 1979-Present.

FIELDS OF EXPERIENCE:

As an environmental engineer at Radian, Ms. Stein has performed several wastewater, solid/hazardous waste, and hydrology related studies.

At present, Ms. Stein is working on several projects including an evaluation of treated wastewater from a gasification facility for use as cooling water. As task leader on this project, Ms. Stein coordinated laboratory bench-scale cooling tower tests and was responsible for data reduction and analysis. These data will subsequently be used to verify Radian's predictive cooling tower computer model.

In addition to the cooling tower study, Ms. Stein is also coordinating a project to characterize the Biotechnology Industry in terms of major processes and products and to identify and characterize the waste streams associated with this industry.

Ms. Stein served as Project Director in the conduct of a laboratory biological treatability study of contaminated leachate from a superfund site in New Jersey. Specific issues addressed in this study include: bioaccumulation of contaminants in the waste sludge, release of volatile organics over the aeration basin, and overall treatment performance for the pollutants of concern. As project director for this study, Ms. Stein's role included development of the test plan, monitoring laboratory operations, data reduction and analysis, and overall project management.

For the Environmental Protection Agency, Ms. Stein recently participated on a project to perform a cost-effectiveness evaluation of various remedial action alternatives for a superfund site in New Jersey. Her primary role on this project was to assess various alternatives for treatment of contaminated ground water at the site. Specifically, Ms. Stein identified treatment alternatives, developed the design criteria for each, and provided cost estimates for leachate treatment.

For a related project, Ms. Stein is participating in an effort to prepare a guidance document which can be used by EPA and state regulatory personnel in developing remedial action plans and/or evaluating the factors affecting reliability and cost-effectiveness. Her task on this project is to develop



Nancy Pacharzina Stein

remedial action data summaries for biological and in-situ waste treatment technologies. Items to be addressed for each technology include applicability, limitations, performance, reliability, safety considerations, and development of a design basis to derive cost estimates.

For a major industrial client, Ms. Stein participated in a project to evaluate remedial action alternatives for the clean-up of wood processing waste ponds. Specifically, Ms. Stein identified appropriate technologies for treatment of both the sludges and liquid wastes and assessed the expected performance of each. Future work on this project will involve development of plans and specifications for the selected alternative and management of implementation.

For a major synfuels syndicate, Ms. Stein participated in the development of a test plan for a bench-scale biological treatment study of coal gasification process wastewaters. Based on the characterization of the wastewater, Ms. Stein derived the appropriate operational parameters and was responsible for monitoring the reactors through the acclimation phase.

For EPA's Effluent Guidelines Division, Ms. Stein served as Task Leader in the Development of Effluent Limitations Guidelines and Standards for the Aluminum Forming Point Source Category. During the project Ms. Stein interfaced with both EPA and representatives from the industrial sector. Major activities on this project included responding to comments on the proposed regulation and planning and conducting plant sampling trips in response to industry comments.

On a major contract for EPA's Office of Solid Waste, Ms. Stein prepared an engineering analysis of High Density Polyethylene (HDPE) production processes. This effort included identifying the major production processes for HDPE, identification and characterization of waste streams from these processes, and development of material balances for each process. The purpose of this analysis was to identify waste streams for potential listing as hazardous waste under RCRA.

For the Laramie Energy Technology Center (LETC), Ms. Stein served as task leader on a project to develop a Hazardous Waste Management Plan (HWMP) and Employee Training Seminar. Her role on this project included critical evaluation of waste handling procedures, development of the HWMP and Training Program, as well as presentation of the training seminar to LETC personel.

On another project for LETC, Ms. Stein participated in a project to inventory and sample potentially hazardous waste at a Department of Energy (DOE) facility. This project involved participating in the actual sampling program, classification of the wastes under RCRA, and development of subsequent disposal alternatives.

Ms. Stein also provided technical assistance to the Environmental Protection Agency (EPA) on the development of Pollution Control Technical Manuals for the synfuels industry. Her role in this project involved characterization of



Nancy Pacharzina Stein

process effluents and the evaluation of biological treatment performance. Additionally, Ms. Stein assisted in the development of a performance and cost model of biological treatment for coal gasification wastewaters.

For a major industrial client, Ms. Stein recently performed a study on the characterization of BIOX sludge from gasification wastewater treatment. This project involved wastewater characterization, a quantitative assessment of BIOX performance, and a determination of trace metal concentrations in the BIOX sludge.

Ms. Stein participated in a study of stormwater runoff treatment for a pilot-scale SRC-II plant. Her role on this project consisted of assessing the quality of coal pile and general plant area runoff to be treated.

For a generic study of the environmental residuals and resource requirements associated with gasification of lignite in Texas, Ms. Stein provided technical input in the areas of water resources and wastewater and solid waste residuals. On this project, Ms. Stein was also responsible for management of the project team.

Ms. Stein was responsible for evaluation of surface coal mining wastewater treatability studies in support of an EPA contract to develop effluent guidelines for the Energy and Mining Point Source Category. This project involved a critical evaluation of the methods used during the studies as well as analysis of the data generated.

Ms. Stein has performed numerous surface-water hydrology site assessments for both government and industrial clients. These projects typically involve a complete characterization of baseline conditions and quantitative assessment of potential impacts to surface waters by the proposed action.



JILL P. ROSSI

EDUCATION:

B.A. Geography, The University of Minnesota at Minneapolis, 1972.

EXPERIENCE:

Geographer, Cartographer, Policy and Environmental Analysis Division, Radian Corporation, Austin, TX, 1980-Present.

Drafting and Graphics Assistant, Dam Safety Unit, Texas Department of Water Resources, Austin, TX, 1979-1980.

Cartographer, Continental Map Inc., Austin, TX, 1978-1979.

Teaching Assistant, University College-Geology, University of Minnesota at Minneapolis, 1972.

FIELDS OF EXPERIENCE:

At Radian, Ms. Rossi is responsible for producing maps and coordinating graphics for the Policy and Environmental Analysis Division. She utilizes data from a variety of technical disciplines (geology, hydrology, noise and air monitoring, sociology, soils, and hydrogeology) to create maps which clearly and concisely illustrate the written text. Ms. Rossi has been responsible for work in the following projects:

- O Develop base maps and coordinate graphics throughout an Environmental Impact Statement prepared for the U.S. Bureau of Land Management for a central Texas lignite mine;
- Develop color overlay method of mapping for site selection process of commercial waste disposal sites in Texas and southeastern Oklahoma;
- O Develop a series of figures used as illustrations in a manual for the Environmental Protection Agency on Remedial Actions at Uncontrolled Hazardous Waste Sites:
- o Draft maps and coordinate the graphics for an Environmental Impact Statement for a synfuels plant in Tennessee;
- Create base and thematic maps for Air Force Installation Restoration Programs (Phase I and Phase II) for the following locations: Kelly AFB, Texas; Hill AFB, Utah; Bergstrom AFB, Texas; Cannon AFB, New Mexico; England AFB, Louisiana; Tinker AFB, Oklahoma; and Reese AFB, Texas;

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Jill P. Rossi

- Map limestone deposits, lime plants, and limestone quarries in the United States by county in a series of regional maps for the Electric Power Research Institute;
- Map compliance/non-compliance with air pollution standards for counties in the United States in a series of EPA regional maps;
- Map concentrations of selected air pollutants in the El Paso, Texas, area for a Texas Air Control Board study in a series of quarterly and annual reports;
- o Prepare aerial photography history of a wood preserving plant for a commercial client which included extensive research of available aerial photography and interpretation of those photos to determine historical features of interest;
- o Prepare complex permitting schedules for proposed mines, energy facilities, and hazardous waste handling sites;
- o Preparation of base and thematic maps for various feasibility studies, fatal flaw analyses, Environmental Information Documents, and Environmental Impact Statements; and
- o Research of available map resources, aerial photography, remote sensing products, and mapping technologies as required by individual client needs.

While with the Texas Department of Water Resources, Ms. Rossi worked in the graphics section of the Dam Safety Unit, a federal grant program. She prepared maps and exhibits, and laid out phototypset text into camera-ready form according to standards, developed with her assistance, for the technical reports written by the engineering section.

During her employment with Continental Map Incorporated, Ms. Rossi was involved in all phases of four color map production. These included source information procurement and classification, imaging base maps, scribing plates, cutting specialties, sizing and adhering type, designing customer copy panels, indexing streets and points of interest, photo-lab contact reproduction of base plates, and the final compositing of the four negative plates to be sent to the printer. These maps included large metroplex areas, counties, enlarged downtown sections, and simplified principle city thoroughfares.

While employed by the University of Minnesota as a Geology Teaching Assistant, Ms. Rossi taught geology laboratory sessions, prepared geology lab work materials, tutored students, and assisted the professors by preparing classroom presentations and grading and proctoring exams.



ANN E. ST. CLAIR

EDUCATION:

M.A., Geological Sciences, The University of Texas at Austin, 1979.

B.A., Geology, Trinity University, 1973.

EXPERIENCE:

Department Head, Radian Corporation, Austin, TX, 1982-Present.

Group Leader, Radian Corporation, 1979-1982.

Senior Geologist, Radian Corporation, 1980-Present.

Staff Geologist, Radian Corporation, 1978-1980.

Research Scientist Associate, The University of Texas at Austin, Bureau of Economic Geology, 1975-1978.

Research Scientist Assistant, The University of Texas at Austin, Bureau of Economic Geology, 1973-1975.

FIELDS OF EXPERIENCE:

At Radian, Ms. St. Clair has had extensive experience in studies relating to ground-water geology, waste disposal, and environmental impacts. Her work has included acquisition of data on ground water, assessment of water quality impacts, and compilation and interpretation of geologic data including geophysical and core logs, and evaluation of impacts of waste disposal and other activities. In hazardous waste studies her work has also involved evaluation of remedial action alternatives and interface with engineers, chemists and other specialists regarding various aspects of hazardous waste investigations including engineering design and cost of remedial action, control of emissions and odors, and waste characteristics. As Department Head at Radian Ms. St. Clair supervises the work of geologists, hydrologists, and ecologists and has management and technical review responsibility for programs in these technical areas.

Ms. St. Clair was Project Director for the second phase of a continuing study at the McColl hazardous waste site in the Los Angeles area. In this phase, data collected in Radian's Phase I field investigation of the site were evaluated and used in the selection and design of the remedial action plan for the site. The site, which is located adjacent to a residential and recreational area, contains various hydrocarbon wastes, principally acidic refinery sludges and drilling muds. Control of volatile emissions, odors, and the potential for contamination of surface water and ground water were addressed in the



remedial action design. The design must meet strict criteria regarding exposure to contaminants both during remedial action implementation and over the long term.

Ms. St. Clair has major responsibility for studies being performed at several uncontrolled hazardous waste sites, including sites identified as priority sites for remedial action under Superfund. She was Project Director for the first phase of a study to evaluate ground-water conditions at a Superfund site in up-state New York which was used for disposal of wastes from a metal plating operation. The study included installation of monitor wells and test borings and collection of soil and ground-water samples in order to define the presence or extent of subsurface contamination. Based on the results of the field investigation, recommendations for further study or remedial action were developed. During the course of this program, Ms. St. Clair has been involved in initial site evaluation and data collection, development of a site field program, and interface with state and federal regulatory agencies.

Ms. St. Clair has had overall technical responsibility for a variety of activities for the EPA Solid and Hazardous Waste Research Division. These studies, generally involving technical support of Superfund activities, have included a field geophysical survey, treatability studies, column absorption/desorption studies, hydrogeologic evaluations, review of feasibility studies, and evaluation of remedial action technologies for approximately ten Superfund sites. Ms. St. Clair's role included project management, technical supervision and review, and agency coordination.

For the Lipari landfill Superfund site near Pitman, New Jersey, Ms. St. Clair was responsible for coordinating a variety of technical activities as support to EPA Region II. The site contains a variety of industrial wastes, of which several volatile organic chemicals known to be extremely hazardous are of primary concern. Leachate seeps enter surface streams adjacent to the site and have resulted in a ban on fishing and boating in a lake 1000 feet downstream. Ms. St. Clair had overall responsibility for coordinating the following activities at this site—cost-effectiveness evaluation of 32 remedial action alternatives, preparation of an Environmental Information Document assessing the environmental impacts of remedial action alternatives, definition of baseline conditions and design of a long-term monitoring program on the lake, and a treatability study of the landfill leachate. For all these activities Ms. St. Clair was the principal interface with EPA and had primary technical review and management responsibility.

In a study for the EPA Municipal Environmental Research Laboratory, Ms. St. Clair supervised development of a methodology for conducting evaluations of cost-effectiveness of remedial actions at uncontrolled hazardous waste sites. Under the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), remedial actions conducted at Superfund sites must be demonstrated to be cost-effective. The study involved review of technical and cost



data on remedial technologies, evaluation of methodologies for cost-effectiveness and related types of analyis, assessment of impacts of time and discount rates on the evaluation, and development of the analytical framework and guidance manual to be used by decision makers in selecting remedial measures.

Ms. St. Clair has participated in Radian's activities related to collection of insurance underwriting information for Environmental Impairment Liability (EIL) Insurance. She worked closely with Radian's parent company, Hartford Steam Boiler Inspection and Insurance Company (HSB) in developing procedures for collection of technical and engineering underwriting information and functions in a Quality Assurance role by reviewing results of all Radian investigations of this type. In 1981 Ms. St. Clair was Project Director for a risk assessment of three power plants in the Boston area. The study involved brief site visits and review of corporate and regulatory agency files in order to assess the potential for gradual environmental impairment as a result of plant activities. The study included assessment of ground-water conditions, waste management practices, hazardousness of materials used on-site, population-atrisk, and corporate approach to environmental matters. A report was prepared containing information for use in underwriting Environmental Impairment (EIL) Insurance.

During 1981, Ms. St. Clair was Project Director for a large program to develop a waste management strategy for the Wyoming Coal Gasification Project. The program involved chemical and physical analysis and regulatory classification of power plant and gasification wastes and organic by-products. Based on the results of the testing, recommendations were made for treatment and disposal of wastes to meet applicable regulatory requirements. In addition, the study included column leaching studies to assess impacts of mine disposal of plant wastes, evaluation of ground water impact of disposal facilities at the plant site, and preparation of applicable state and federal permit applications.

In 1980-1981, Ms. St. Clair was Project Director for a program to evaluate waste disposal practices and ground-water conditions at a large petroleum refinery in Kenai, Alaska. The study focused on development of a long-term waste management strategy for disposal of refinery wastes, principally API separator bottoms and crude tank bottoms, which have been designated as hazardous wastes under RCRA. Initially Ms. St. Clair supervised design, installation and sampling of ground-water monitoring wells in the vicinity of existing disposal sites in order to assess the water-quality impacts of past disposal practices. Samples of all refinery waste streams and wastes from existing pits were characterized for the purpose of developing a plan for closure of existing pits and an ultimate waste management plan. Options were evaluated with respect to technical feasibility (particularly in light of climatic factors), environmental acceptability, regulatory compliance, and economics.

In 1979, Ms. St. Clair was Project Director for an investigation of soil/ground-water contamination and remedial action at a pesticide formulation



facility in north Texas. The study was aimed at evaluating possible contamination from underground waste storage tanks suspected of leaking. Ms. St. Clair initially conducted sampling of soils in the vicinity of the tanks to determine if leakage had occurred. She also designed and supervised installation of a network of ground-water monitoring wells in order to evaluate ground-water flow at the site and to assess water-quality impacts of the suspected leakage. During drilling, core samples were taken in both the unsaturated and saturated zone for chemical analysis. Ms. St. Clair performed slug tests on the wells to provide data on aquifer properties. She also supervised infiltration tests in order to evaluate the surface infiltration conditions and to qualitatively assess the potential for leachate generation. Based upon the results of this study, recommendations were made for further studies and possible remedial actions.

In a study to determine impacts of a product spill at a Solvent Refined Coal-II demonstration plant in Fort Lewis, Washington, Ms. St. Clair was responsible for portions of the ground-water evaluation, including installation of monitoring wells, measurements of water levels, and interpretation of hydrologic and chemical data. She was also involved in interfacing with state regulatory agencies.

Ms. St. Clair was Project Director of a study for EPA Region III, evaluating the suitability of land around the Cheswick Power Station near Pittsburgh, Pennsylvania, for disposal of coal ash and scrubber sludge. The study was conducted as technical support for enforcement actions brought by EPA Region III concerning alleged violations of air emissions regulations from the coalfired power plant. In the event that installation of SO₂ scrubbers was to be required by EPA, this study was underaken to document the availability of land for disposal of wastes from the scrubbers. During the study, Ms. St. Clair supervised a multidisciplinary team evaluating the hydrogeology, transportation, land use, ecology, and economic factors affecting the acceptability of sites in the vicinity of the plant for disposal of wastes.

In a study for EPA Region VII, Ms. St. Clair supervised several programs concerned with suitability of soils for septic tanks and nitrate contamination of ground water in Missouri. Ms. St. Clair supervised technical efforts on three programs. One program involved detailed soils mapping and field examination of septic tank failures in Greene County, Missouri, and in order to develop a septic-tank suitability map. Another study focused on determination of any relationships between water well construction practices and occurrence of ground water contamination in Howell County, Missouri. It involved a field survey for sampling of ground water and for obtaining information on well construction. A third program was conducted to develop a regional map of nitrate concentrations in ground water in the four-state area of EPA Region VII. In addition to development of technical reports for each of these studies, reports were prepared for lay readers.

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Ann E. St. Clair

Ms. St. Clair was Project Director for a feasibility and site selection study for an in-situ gasification project utilizing Texas lignite. The study focused on evaluation of environmental factors that might affect project feasibility. Ms. St. Clair was involved in overall project coordination as well as studies related to environmental and hydrologic conditions at several candidate sites.

As a research associate at the Bureau of Economic Geology, Ms. St. Clair was involved in numerous studies requiring collection and interpretation of geologic data, sampling and chemical analysis of ground water, and evaluation of environmental and engineering impacts of man's activities. She was responsible for the preparation of maps, technical reports, and presentations, as a part of these programs.

PROFESSIONAL/TECHNICAL SOCIETIES:

American Institute of Profession Geological Scientists, Certified Professional Geological Scientist 4741; National Water Well Association, Ground Water Technology Division; Geological Society of America; Austin Geological Society.

PUBLICATIONS:

Radian Corporation, "Cost-Effectiveness Evaluation of Remedial Action Alternatives for the McColl Site, Fullerton, California," Final Report, June 1983.

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St. Clair, A.E., M.H. McCloskey, and J.S. Sherman, "Development of a Framework for Evaluating Cost-Effectiveness of Remedial Actions at Uncontrolled Hazardous Waste Sites," Proceedings, Third National Conference on Management at Uncontrolled Hazardous Waste Sites, Washington, DC, December 1982.

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Grimshaw, T.W., J.L. Machin, J.R. Mase, A.E. St. Clair, and F.H. Sheffield, "Hydrology Related Regulatory Risks for Lignite Mining at a Prospect in Eastern Texas and Western Louisiana," July 1979.

Garner, L.E., A.E. St. Clair, and T.J. Evans, "Mineral Resources of Texas (map)," Bureau of Economic Geology, University of Texas, Austin, 1979.

St. Clair, A.E., "Mineral Lands in the City of Dallas: Bureau of Economic Geology," University of Texas, Austin, Geological Circular 78-1, 1978.

St. Clair, A.E., T.J. Evans, and L.E. Garner, "Energy Resources of Texas (map)," Bureau of Economic Geology, University of Texas Austin, scale 1:1,000,000, 1976.



St. Clair, A.E., C.V. Proctor, W.L. Fisher, C.W. Kreitler, and J.H. McGowen, "Land and Water Resources, Houston-Galveston Area Council," Bureau of Economic Geology, University of Texas, Austin, Land Resources Laboratory Map Series, 25 p., 4 maps, scale 1:125,000, 1975.

01/16/84



APPENDIX L
Geophysical Tracings



DRAFT

Specifications of Ground Conductivity Meters Utilized for Geophysical Surveys (from manufacturer's literature, Geonics, Ltd.)

ONE MAN

CONTINUOUS READING



EM31

The Georics EM31 provides a measurement of terrain conductivity without contacting the ground using a patented inductive electromagnetic technique. The instrument is direct reading in millimnos per meter and surveys are carried out simply by traversing the ground.

The effective depth of exploration is approximately six meters making it ideal for engineering geophysics. By eliminating ground contact, measurements are easily carried out in regions of high resistivity such as gravel, permatrost and bedrock Over a uniform half space the EM31 reads identically with conventional resistivity and the measurement is analogous to a conventional galvanic resistivity survey with a fixed array spacing, interpretation curves supplied with each instrument often permit an estimate of a layered earth.

The advantages of the EM31 are the speed with which surveys can be carried out, the ability to precisely measure small changes in conductivity, and the continuous readout which provides a previously unobtainable lateral resolution.

Specifications

MEASURED QUANTITY Apparent conductivity of the ground in millimnos per

PRIMARY FIELD SOURCE Self-contained dipole transmitter

SENSOR Self-contained dipole receiver

INTERCOIL SPACING 3.66 meters

OPERATING FREQUENCY 9.8 kHz

POWER SUPPLY 8 disposable alkaline 'C' cells (approx. 20 hrs life con-

CONDUCTIVITY RANGES 3, 10, 30, 100, 300, 1000 mmnos/meter

MEASUREMENT PRECISION ±2% of full scale

MEASUREMENT ACCURACY ±5% at 20 millimnos per meter NOISE LEVEL < 0.1 millimnos per meter

OPERATOR CONTROLS & Mode Switch

Conductivity Range Switch Phasing Potentiometer
 Coarse inphase Compe inphase Compensation Fine Inphase Compensation

DIMENSIONS 4.0 meters extended

1 4 meters stored Console 24 x 20 x 18 cm Shipping Crate 155 x 42 x 28 cm

WEIGHT

Instrument Weight 9 kgm Shipping Weight 23 kgm

TWO MAN VARIABLE DEPTH



EM34-3

Operating on the same principles as the EM31, the EM34-3 is designed to achieve a substantially increased depth of exploration and a readily available vertical conduclivity profile

The underlying principle of operation of this patented non-contacting method of measuring terrain conductivity is that the depth of penetration is independent of terrain conductivity and is determined solery by the instrument geometry (i.e. the instrument geometry) (i.e. the instrument geometry) (i.e. the instrument geometry) (i.e. the instrument geometry) (i.e. the instrument geometry) (i.e. the instrument geometry) (i.e. the instrument senses to approximate operations of 10, 20, or 40 meters and in the vertical copianal rais shown) or horizontal copianal mode, in the vertical copianal mode, the instrument senses to approximate the of 10, 20, or 40 meters and in the vertical copianar (as shown) or horizontal co-planar mode, in the vertical copianar mode, the instrument senses to approxi. O 75 of the intercoil spacing, in the horizontal copianar mode, the instrument can sense to 1.5 times the intercoil spacing. For the horizontal copianar mode, nowever, coil mis-alignment errors are more serious tinan in the vertical mode so greater care must be exercised to achieve the maximum 6.0 meters death. exercised to achieve the maximum 60 meter depth

Simple operation, survey speed and straight forward data interpretation makes the EM34-3 a versatile and cost effective tool for the engineering geophysicist.

Specifications

MEASURED QUANTITY Apparent conductivity of the ground in millimhos per

meter

PRIMARY FIELD SOURCE Self contained dipole transmitter SENSOR Self contained dipole receiver

REFERENCE CABLE Lightweight, 2 wire shielded cable

INTERCOIL SPACING & ©10 meters at 6 4 kHz
OPERATING FREQUENCY ©20 meters at 1 6 kHz
©40 meters at 0 4 kHz

POWER SUPPLY

Transmitter 8 disposable 0' cells Receiver 8 disposable 0' cells

CONDUCTIVITY RANGES 3, 10, 30, 100, 300 mmhos/meter

MEASUREMENT PRECISION : 2% of full scale deflection MEASUREMENT ACCURACY :5% at 20 millimnos per meter

NOISE LEVEL DIMENSIONS

WEIGHTS

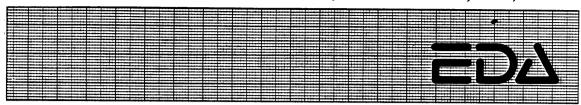
< 0.2 millimnos per meter

Receiver Console 19 5 x 13 3 x 26cm
Transmitter Console 15 x 8 x 26cm
Coils 53cm diameter

Couls Receiver Console 3.1 kg

Receiver Coil 3 2 kg
Transmitter Console 3 0 kg Transmitter Coil 6 0 kg Shioping Weight 41 kg

SPECIFICATIONS OF MAGNETOMETER UTILIZED FOR GEOPHYSICAL SURVEYS (From Manufacturer's Literature, EDA Instruments, Inc.)



Specifications

Dynamic Range

Tuning Method

Automatic Fine Tuning

Display Resolution **Processing Sensitivity** Statistical Error Resolution

Absolute Accuracy

Standard Memory Capacity Total Field or Gradient Tie-Line Points Base Station

RS 232 Serial I/O Interface **Gradient Tolerance** Test Mode

Sensor

Display

Gradient Sensors

Sensor Cable

Cycling Time (Base Station Mode)

Operating Environmental Range **Power Supply**

Battery Cartridge/Belt Life

Weights and Dimensions Instrument Console Only NiCad or Alkaline Battery Cartridge NiCad or Alkaline Battery Belt Lead-Acid Battery Cartridge Lead-Acid Battery Belt

Gradient Sensor (0.5 m separation-standard)

Gradient Sensor (1.0 m separation - optional) Standard System Complement

Base Station Option Gradiometer Option 18,000 to 110,000 gammas. Roll-over display feature suppresses first significant digit upon exceeding 100,000 gammas.

Tuning value is calculated accurately utilizing a specially developed tuning algorithm

 \pm 15% relative to ambient field strength of last stored value

0.1 gamma ± 0.02 gamma 0.01 gamma

± 1 gamma at 50,000 gammas at 23°C ± 2 gamma over total temperature range

1.200 data blocks or sets of readings 100 data blocks or sets of readings 5,000 data blocks or sets of readings

Custom-designed, ruggedized liquid crystal display with an operating temperature range from -40°C to +55°C. The display contains six numeric digits, decimal point, battery status monitor, signal decay rate and signal amplitude monitor and function descriptors.

2400 baud, 8 data bits, 2 stop bits, no parity 6,000 gammas per meter (field proven)

A. Diagnostic testing (data and programmable memory) B. Self Test (hardware)

Optimized miniature design. Magnetic cleanliness is consistent with the specified absolute accuracy. 0.5 meter sensor separation (standard), normalized to gammas/meter. Optional 1.0 meter sensor separation available. Horizontal sensors optional.

Remains flexible in temperature range specified, includes strain-relief connector

Programmable from 5 seconds up to 60 minutes in 1 second increments

-40°C to +55°C; 0-100% relative humidity; weatherproof Non-magnetic rechargeable sealed lead-acid battery cartridge or belt; rechargeable NiCad or Disposable battery cartridge or belt; or 12V DC power source option for base station operation.

2,000 to 5,000 readings, for sealed lead acid power supply, depending upon ambient temperature and rate of readings

2.8 kg, 238 x 150 x 250mm 1.2 kg, 235 x 105 x 90mm 1.2 kg, 540 x 100 x 40mm 1.8 kg, 235 x 105 x 90mm 1.8 kg, 540 x 100 x 40mm 1.2 kg, 56mm diameter x 200mm

2.1 kg. 56mm diameter x 790mm

2.2 kg, 56mm diameter x 1300mm

Instrument console; sensor; 3-meter cable, aluminum sectional sensor staff, power supply, harness assembly,

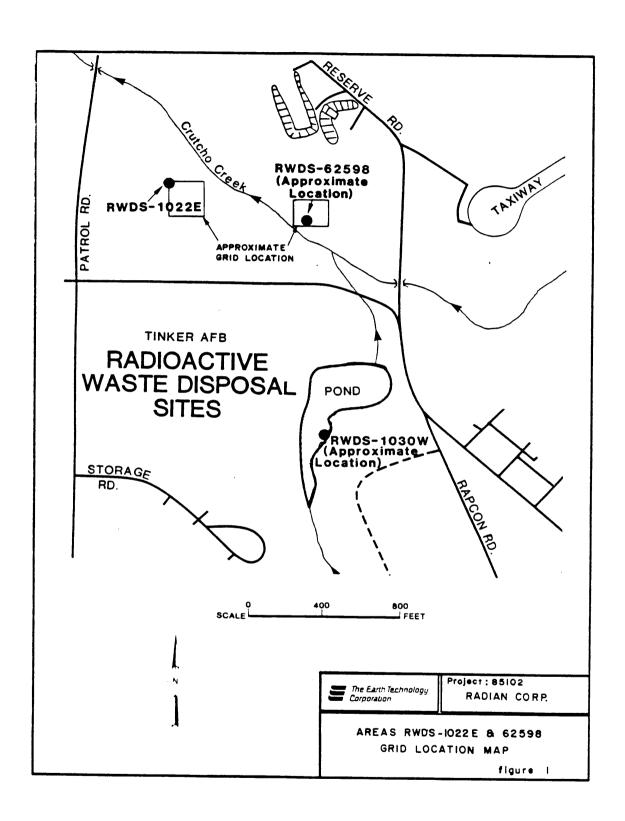
operations manual. Standard system a

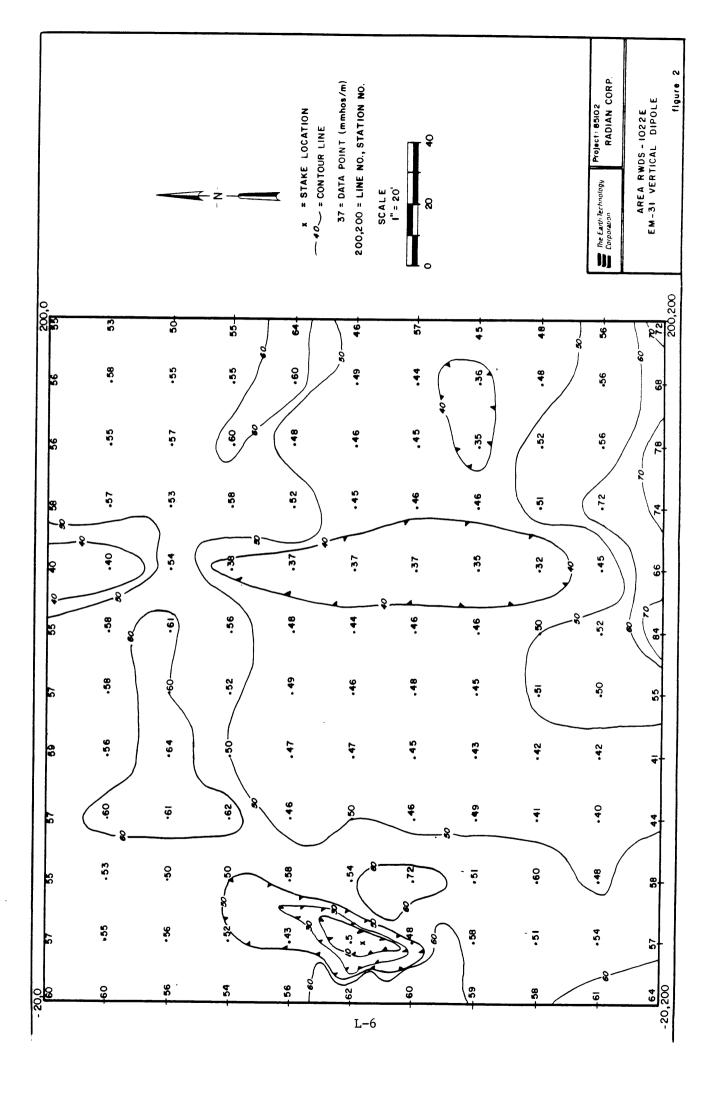
Standard system 0.5 meter sensor

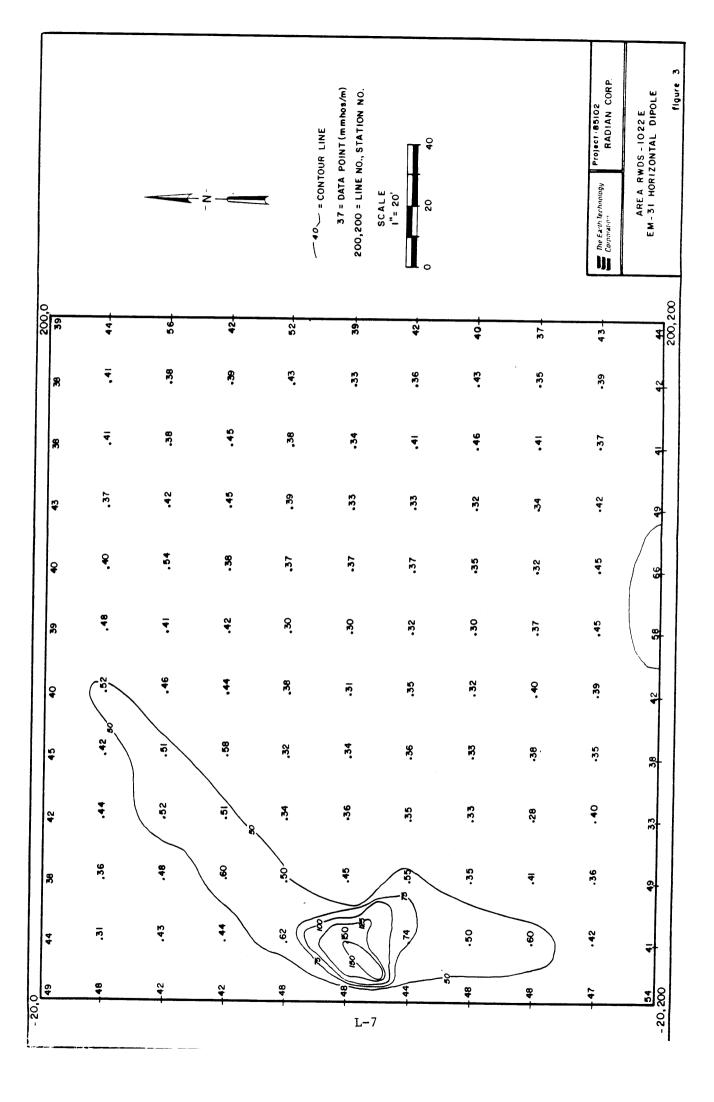
E D A Instruments Inc 4 Thorncliffe Park Drive Toronto Ontario Canada M4H 1H1 Telex: 06 23222 EDA TOR Cable: Instruments Toronto (416) 425 7800

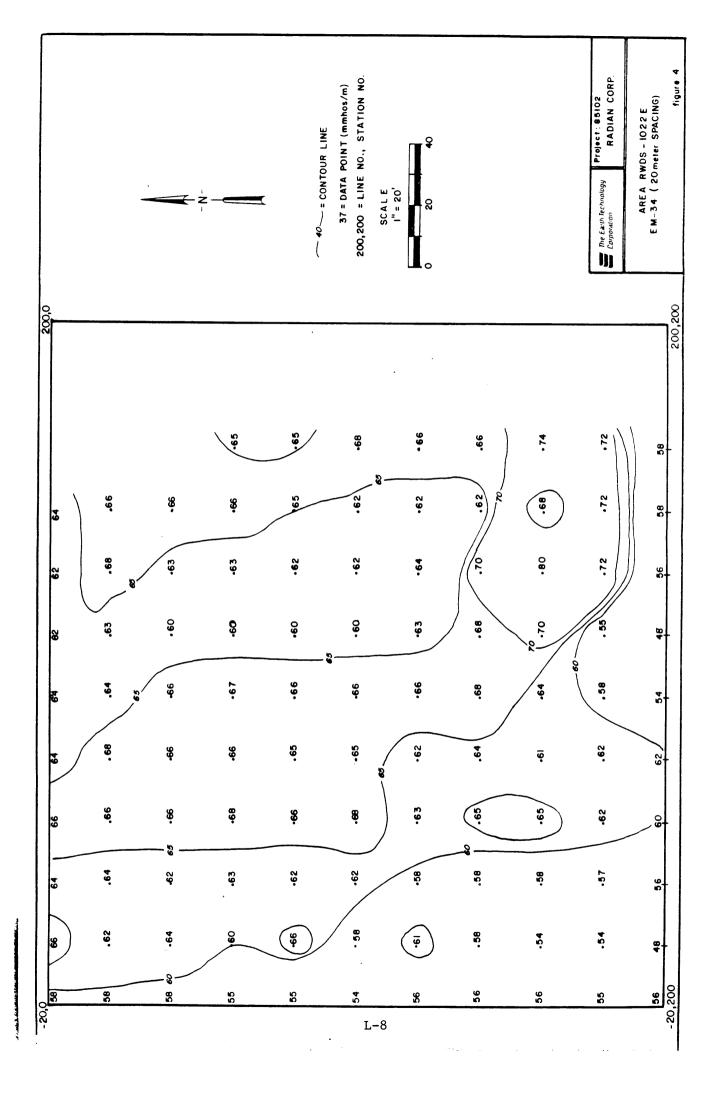
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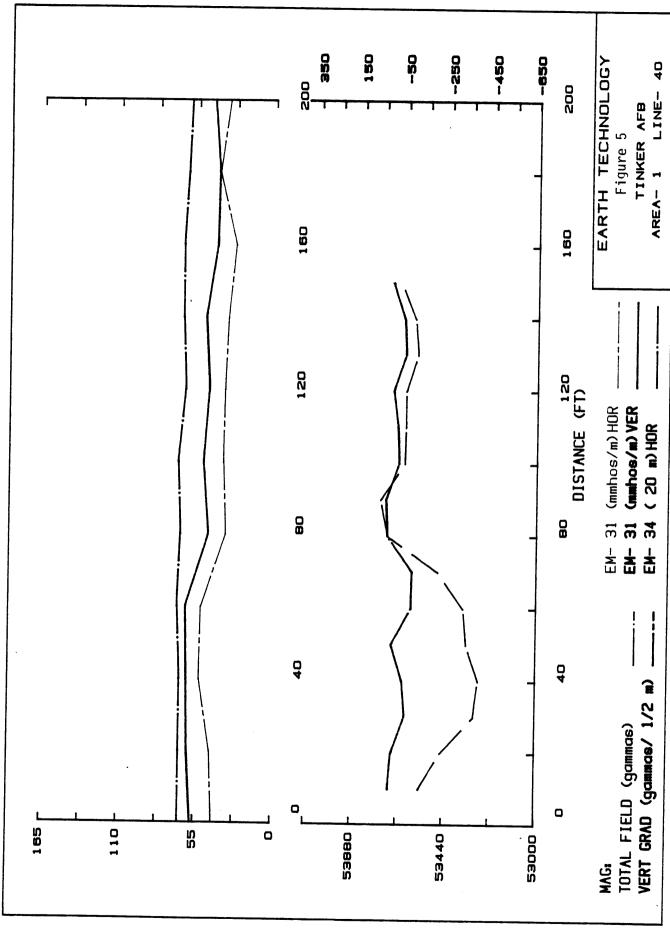
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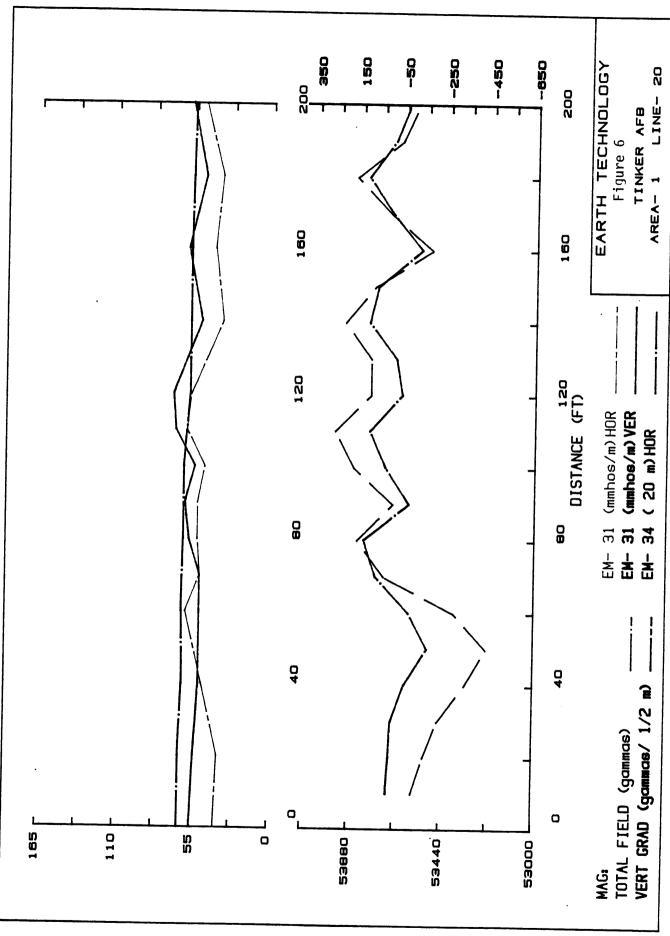


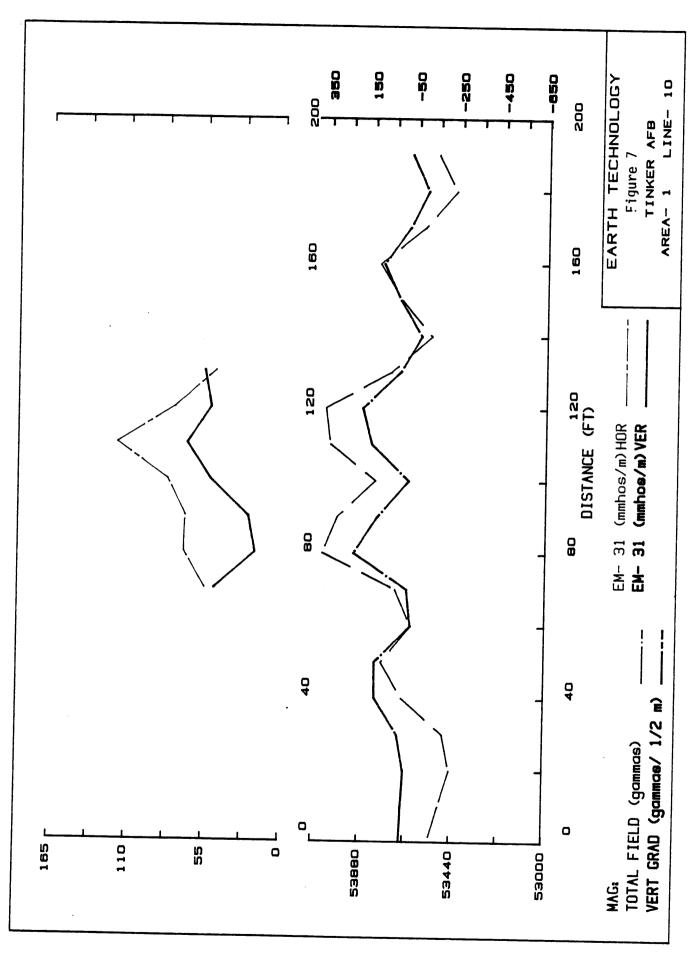


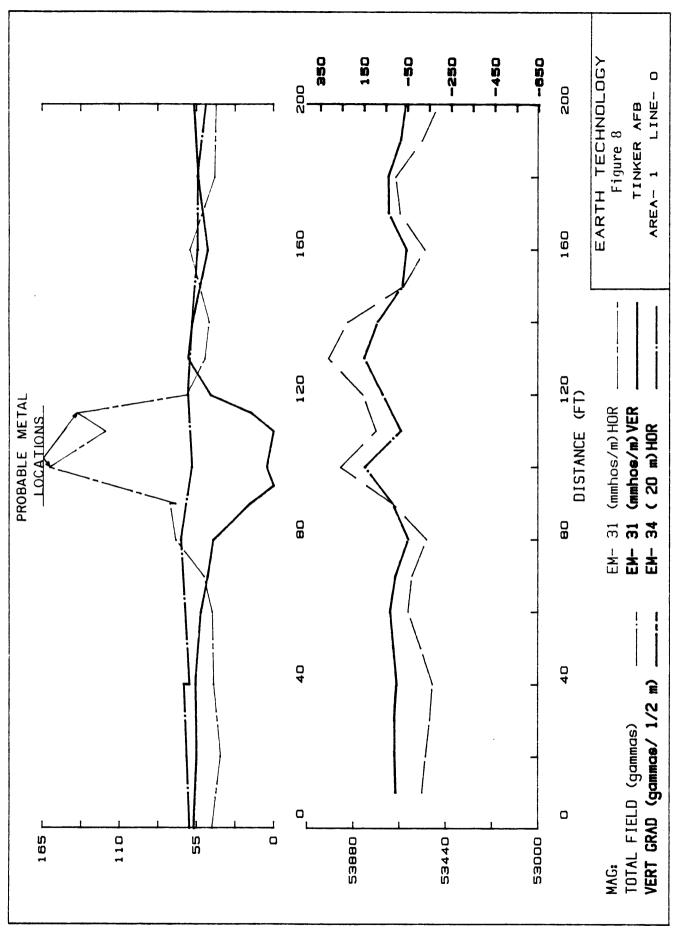


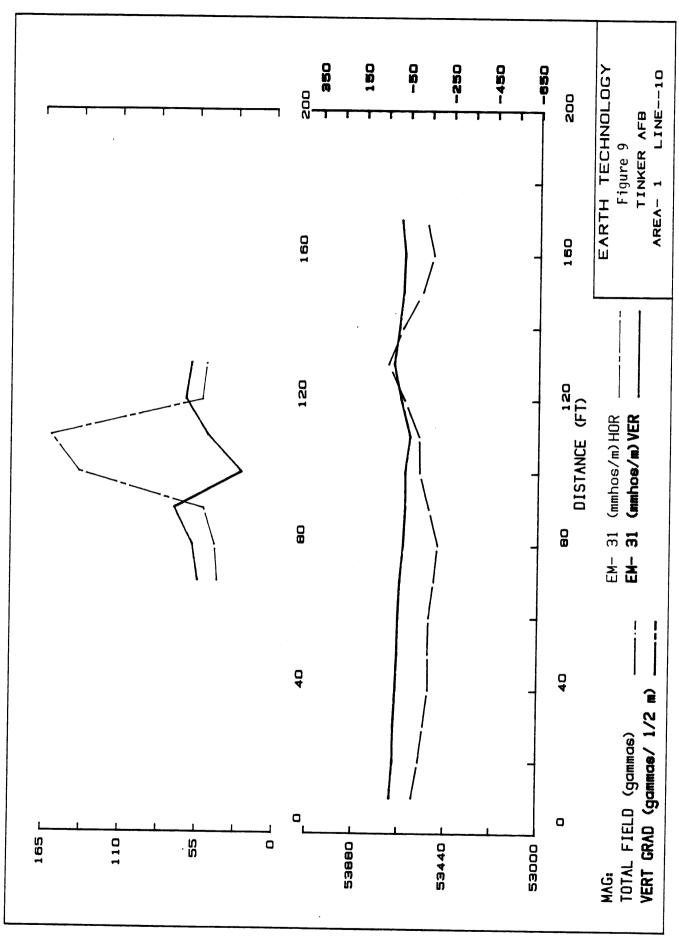


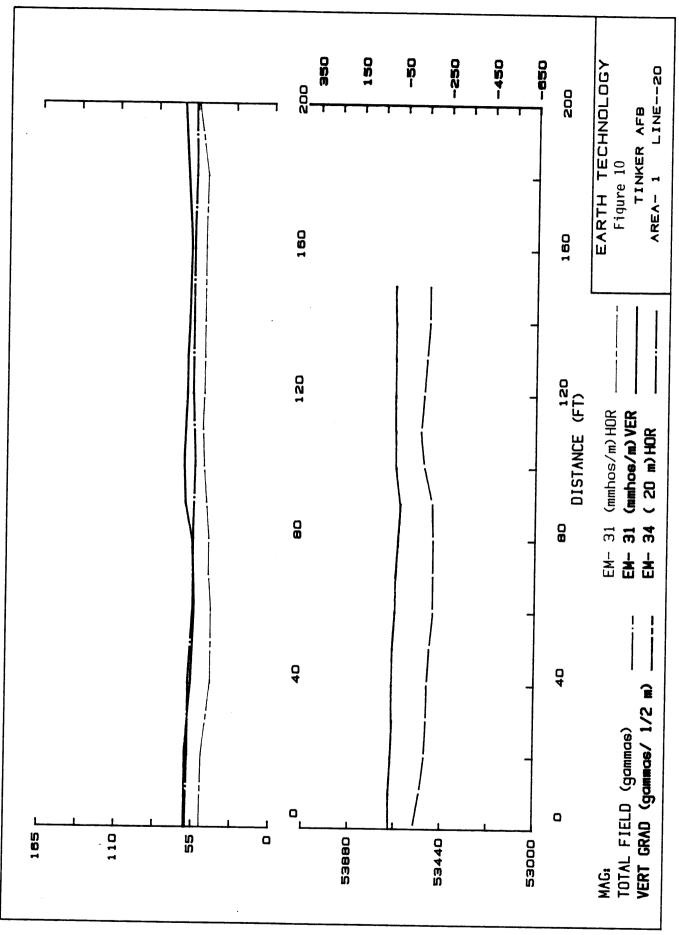


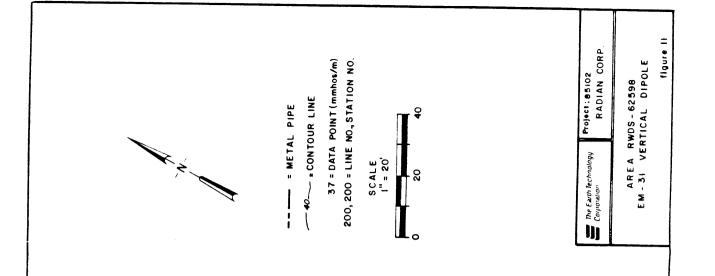


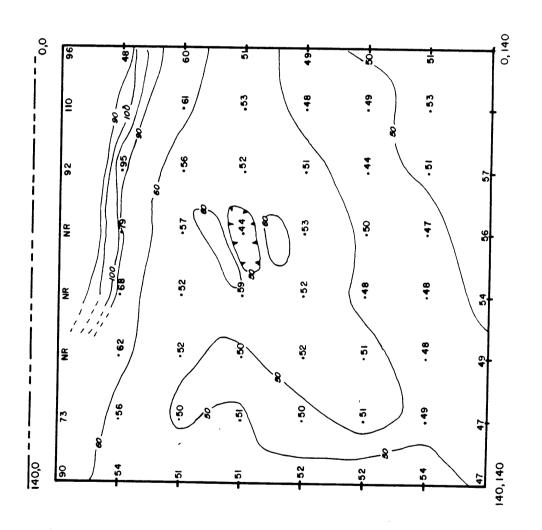


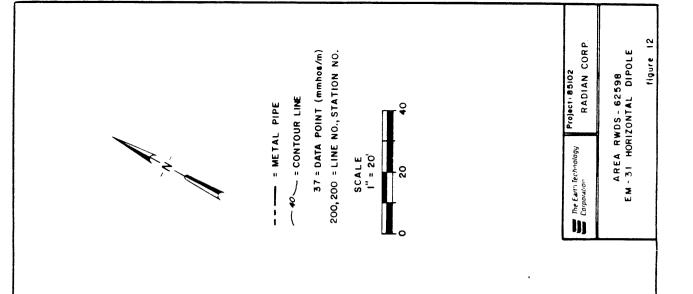


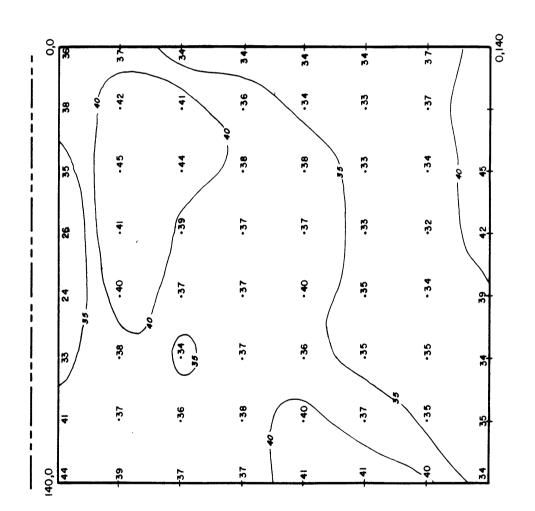


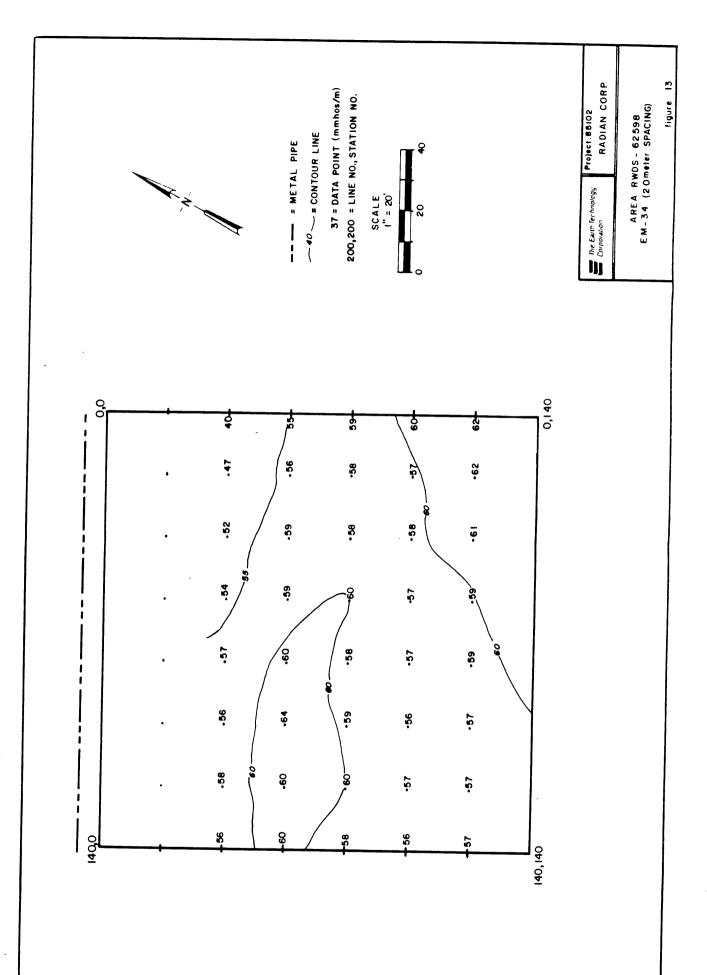


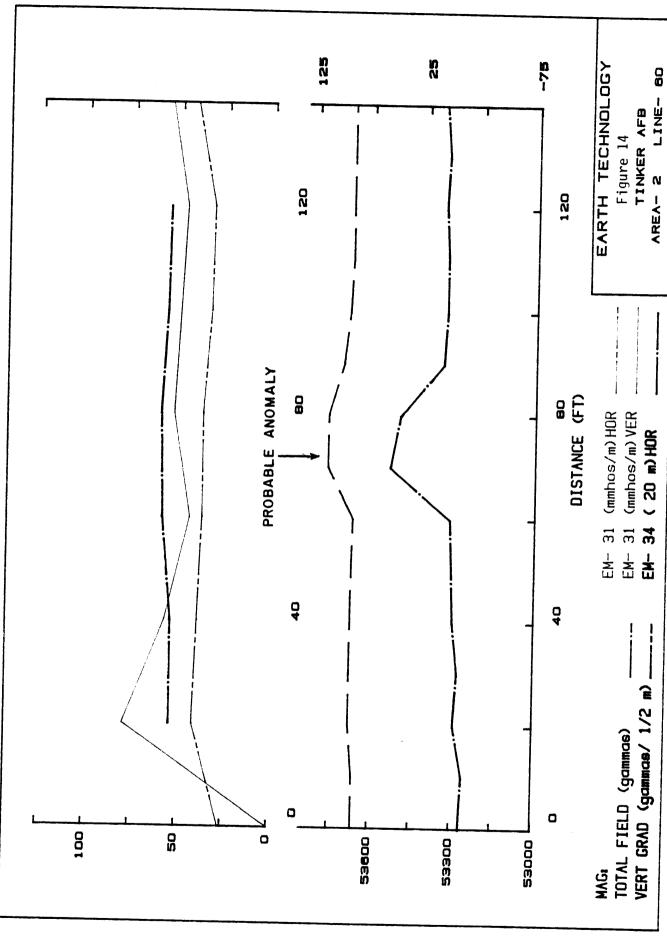


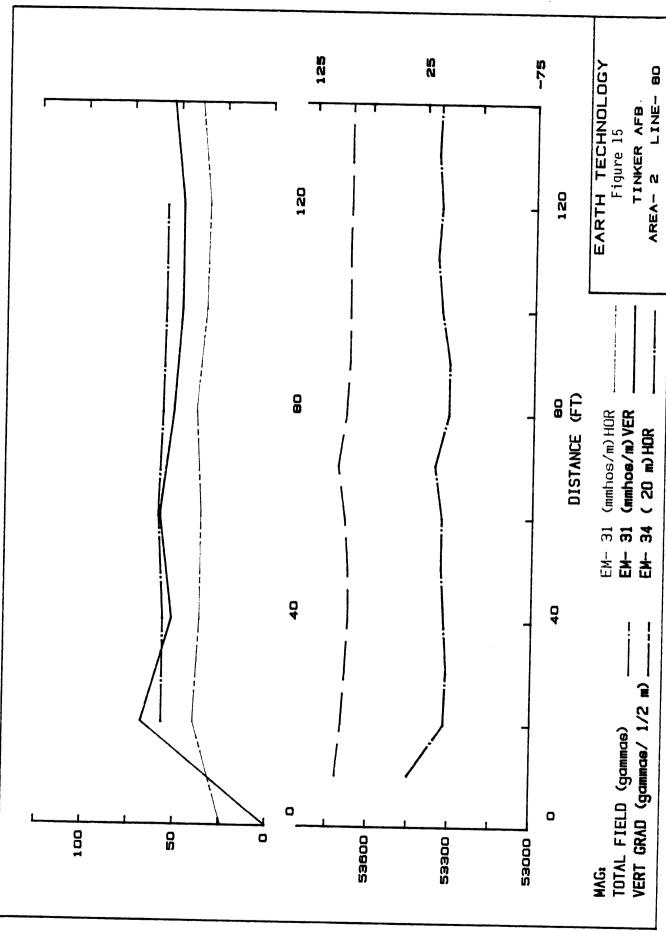


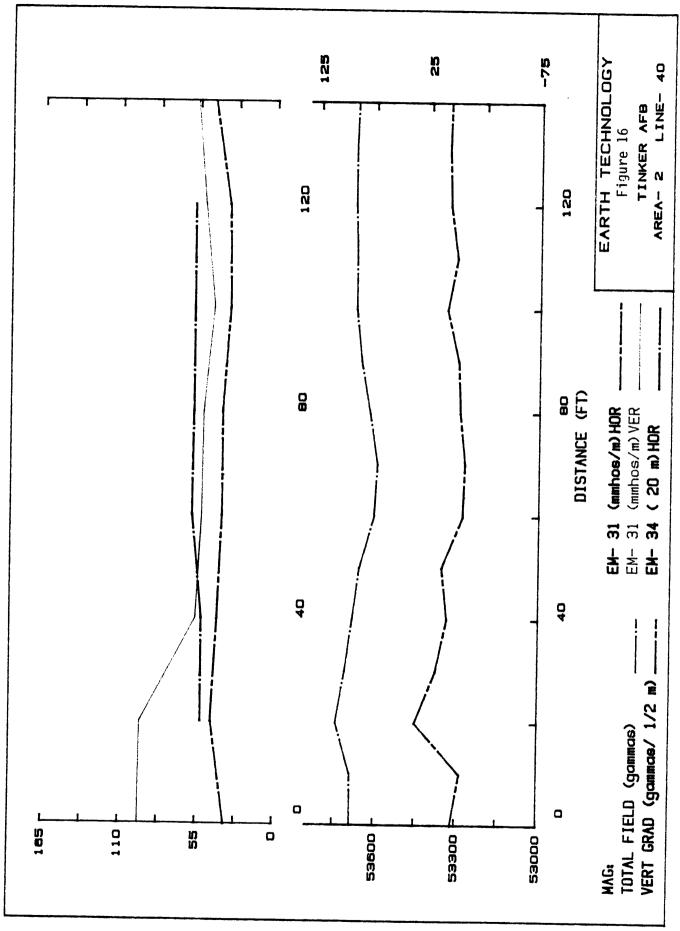














APPENDIX M

Safety Plan Utilized on this Project

TINKER AFB IRP PHASE IIB SAFETY AND HEALTH PLAN

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25 October 1983

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1.0 PROJECT DESCRIPTION

The purpose of this project is to determine if environmental contamination has occurred from the waste disposal practices at Tinker AFB, OK. The project consists of a variety of field activities; the installation of wells and sample collection, analysis of samples, and reporting. This safety plan is to address the field activities.

The following activities are required in the field portion of the project:

- Installation of six deep sampling wells utilizing an air rotary drilling rig (open hole drilling prior to well casing installation). These wells are not situated directly over the waste site, but they may pass through contaminated ground water.
- o Drilling of five soil borings utilizing a hollow-stem auger. These soil borings are directly over a waste site.
- O Collection of 16 well water samples, six from the newly completed deep wells, eight from existing shallow ground water wells, and two from the soil boring holes.
- o Collection of 30 soil samples from the soil boring holes.
- Collection of five leachate samples from existing seeps.

- o Collection of four water samples from an existing recreational impoundment.
- o Performance of surface geophysical testing.

There exists a reasonable probability that all of these activities, with the exception of the geophysical testing, will result in contact with waste contaminated materials. The waste materials include pesticide containers, a wide variety of solvents (including trichloroethylene), metal plating wastes, fuels and oils and radioactive wastes. It is considered highly improbable that radioactivity will be encountered in any samples except the impoundment water samples, and there in low to background levels.

2.0 RATIONALE OF SAFETY APPROACH

The Supervising Geologist is responsible for the proper execution of the safety plan described herein which is for the prevention of deleterious exposure to hazards associated with the handling of toxic wastes. Additionally, typical safety practices related to drilling activities must also be observed (use of safety hats, shoes, and life vests in boat use, etc.). These safety and health practices are to be observed by all Radian personnel and subcontractor personnel.

The potential for worker exposure to fumes and vapors requires gas-proof eye protection. This is accomplished by using full-face respirators. Respiratory protection must include organic vapor, acid gas, and fume protection. The expected concentrations should be within the capacity of air purifying respirator protection. Ambient air monitoring will be performed to provide an indication of excessive levels, which will then require increased protections. The collection of and working with aqueous samples requires splash protection, to be provided by coveralls and jackets. The handling of samples that may contain a wide range of solvents, including trichloroethylene, requires two-layer hand protection.

This safety program is established as a minimum requirement. Variations from the program for greater protection will not be discouraged. However, decreasing the protection must be authorized by the Supervising Geologist or the Project Director. Program changes will be documented in the after-action report.

3.0 SAFETY TRAINING

Prior to the initiation of site activities, a training session will be held to discuss the proposed work, associated safety and health plans, and emergency response plans. All personnel assigned to drilling activities and water sampling efforts will be instructed regarding the potential health and safety hazards associated with the work and protective measures available. Specifically, the following topics will be covered in the training session:

- o Potential routes of contact with toxic and/or corrosive substances
 - skin contact/adsorption
 - eye contact
 - inhalation
 - ingestion
- o Types, proper use, limitations and maintenance of applicable protective clothing and equipment
 - safety helmet
 - industrial safety glasses
 - chemical goggles
 - chemical resistant gloves
 - chemical resistant safety-toe boots
 - chemical resistant body coverings (apron, blouse, trousers, coveralls)
- Respiratory protection using half- and fullfacepiece air purifying respirator with replaceable filter cartridges
 - Hierarchy of protective controls: engineered, administrative, work practice, personal protective clothing and equipment.

- Forms of respiratory protection: air purifying (disposal/reusable), air supplied, self contained.
- Selection of respiratory protection based on hazard: dust, fume, mist, gas, irritant, warning properties.
- NIOSH certification/approval of respiratory protection equipment.
- Medical/physical/physiological fitness to wear respiratory protection (e.g., spirometry, clean shaven, etc.).
- Reevaluation of respirator selection.
- Use, limitations and maintenance of full-facepiece air-purifying respirator: qualitative fit test, routine inspection, replacement of parts, cleaning/ disinfection, storage.
- Use, limitations and maintenance of half-facepiece air-purifying respirator: qualitative fit test, routine inspection, replacement of parts, cleaning/ disinfection, storage.
- Reporting of accidents and availability of medical assistance.

4.0 PROTECTIVE CLOTHING AND EQUIPMENT

All monitoring well installation work will be performed by persons wearing the following required personal protective equipment:

- o PVC bib overalls
- o PVC jacket
- o Gauntlet style, chemical resistant, Viton gloves over butyl rubber gloves
- o Chemical resistant safety toe, steel shank boots
- o Respirator (full-facepiece air purifying)
- o Safety helmet

Depending on site conditions and drilling conditions, other items may be used for supplemental protection. Such items may include:

- o Tyvek® coveralls
- o Chemical resistant apron
- o Respirator (half-facepiece, air purifying)
- o Chemical eye goggles or safety spectacles with side shields

Because of the potential for migration of contaminants into and through the shallow aquifer zone, well-defined disposal site boundaries are uncertain. Several disposal sites have a high potential for migration of contaminants. Most of the monitoring wells will be installed in areas hydraulically down-gradient of known disposal sites or in areas of unknown ground water flow direction. Since the degree of contamination and potential migration patterns of contaminants are not known, respirator use will be required as a precaution during all drilling activities and well installation work. Full-facepiece air purifying

respirators will be used with Ultra-Twin GMC Cartridges for acid gases, dust and fume protection, and organic vapors. The Supervising Geologist may decide to implement the use of half-face-piece, air purifying respirators depending on specific site and drilling conditions. Only when well installation work is being performed in areas hydraulically up-gradient of respective sites and when there is considerable confidence that well locations are outside zones of possible cross-contamination, may respirator use be discontinued.

5.0 WORK ZONES AND DECONTAMINATION PROCEDURES

To minimize the transfer of hazardous substance(s) from the site, contamination control procedures are needed. Contaminants must be removed from people and equipment prior to relocation from a work zone.

5.1 Work Zones

Prevention of exposures and spread of contamination will be controlled through the establishment of work zones. Two primary work zones will be utilized and will be referred to as the (1) Exclusion Zone and (2) Decontamination Zone.

The Exclusion Zone is the area where disturbance activities are conducted and where contaminants are or may be present. Only those properly trained individuals attired in the specific protective clothing and equipment will be allowed to enter and work in this zone.

The Decontamination Zone is the area where personnel and equipment will be decontaminated before moving to the next site.

The Exclusion Zone will comprise a 25-foot radius circle around the monitoring well and the Decontamination Zone will comprise a 25-foot wide ring around the Exclusion Zone as shown in Figure 5-1.

5.2 Decontamination Procedures

Personal protective equipment and drilling/sampling equipment can become contaminated in a number of ways including:

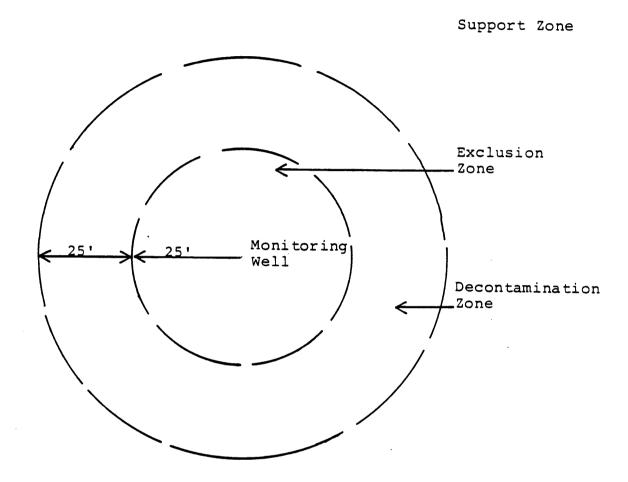


Figure 5-1. Monitoring Well Work Zone.

- Contacting vapors, gases, mists, or particulates in the air.
- Walking through puddles of liquids or on contaminated soil.
- Using contaminated instruments or equipment.

Protective clothing and respirators help prevent the wearer from becoming contaminated or inhaling contaminants, while good work practices help reduce contamination of protective clothing, instruments, and equipment. Even with these safeguards, contamination may occur. Harmful materials can be transferred into clean areas, exposing unprotected personnel. Or in removing contaminated clothing, personnel may contact contaminants on the clothing and/or inhale them.

Decontamination consists of physically removing contaminants. How extensive decontamination must be depends on a number of factors, the most important being the type of contaminants involved. The more harmful the contaminant, the more extensive and thorough the decontamination must be. Combining decontamination, the correct method of doffing personnel protective equipment, and the use of site work zones minimizes cross-contamination from protective clothing to wearer, equipment to personnel, and one area to another.

Decontamination at the monitoring wells will be accomplished by physically removing contaminants from the surfaces of personal protective equipment and drilling/sampling equipment with detergent water followed by rinse with clean water. The process will be repeated (see Figure 5-2).

Final rinse of dril sampling equipment clean water	
Rewash drilling/ sampling equipment detergent water	with

Rinse drilling/ sampling equipment with clean water

Wash drilling/ sampling equipment with detergent water Wash exposed skin surfaces

Remove respirators and gloves

Final rinse of PPE with clean water

Rewash PPE with detergent water

Rinse PPE with clean water

Wash PPE with detergent water

Monitoring Well

Decontamination Zone



Exclusion Zone

Figure 5-2. Monitoring Well Decontamination Procedures.

6.0 SAFETY MONITORING

In addition to the use of personal protective equipment and respirator protection, safety support plans are also necessary. At Tinker AFB, safety support will constitute ambient air monitoring of hazardous and/or toxic materials for the protection of Radian and Air Force personnel and emergency response in the event of an employee injury or other medical emergency.

6.1 Ambient Air Monitoring

Ambient air monitoring will be performed using two techniques. One technique will use the combustible gas meter (TLV Sniffer) and the other will use colorimetric indicator tubes and the grabsampling method. All readings must be documented (minimum 2/hole) in field notes.

Air monitoring will be performed during drilling activities to determine if the respiratory protection chosen affords adequate protection from contaminant concentrations found on-site.

6.1.1 TLV Sniffer

A Bacharach Instruments TLV Sniffer will be used to locate on-site organic vapor concentrations that are higher than ambient outdoor air concentrations. The instrument will be used to determine general areas of elevated organic vapor concentrations, and not as a precision analytical instrument. It is an instantaneous measuring instrument and displays concentrations on a meter in parts per million (ppm), referenced to hexane.

The TLV Sniffer displays a meter reading directly in parts per million (ppm) volatile flammable vapor allowing an estimate of combustible gas concentrations. The instrument can be calibrated to read directly in parts per million for any one of many kinds of combustible gases. Factory calibration is for hexane unless otherwise specified, though readings from other gases and vapors may be interpreted easily by means of reading conversion curves (Figure 6-1).

6.1.2 Grab-Sampling Using Colorimetric Indicator Tubes

A Draeger® kit with an assortment of indicator tubes will be used to obtain quick analysis of unknown hazardous substances in air. The Draeger® tubes are colorimetric direct reading detector tubes and function as "real time" hazardous condition indi-Samples will be collected during drilling activities. An initial screening tube (Polytest®) will be used for a general This tube will give a positive reaction indiqualitative test. cating the presence of ethyl acetate, benzene, acetone, alcohol, and/or hydrocarbons. If a positive reaction does occur, more specific tests may be made using more specifically reacting Draeger® tubes. Table 6-1 lists the sampling strategy to be used when obtaining grab-samples via Draeger® tubes at Tinker AFB. In addition to the Polytest®, any of the detector tubes listed in Table 6-1 may be used individually if the presence of that compound is suspected.

The respirators selected for use at Tinker AFB have been assigned protection factors by the National Institute for Occupational Safety and Health (NIOSH). These respirator protection factors are listed in Table 6-2. In event that sampling results indicate that the respective Threshold Limit Values (TLVs) may be exceeded, concentrations should be compared to the Protection

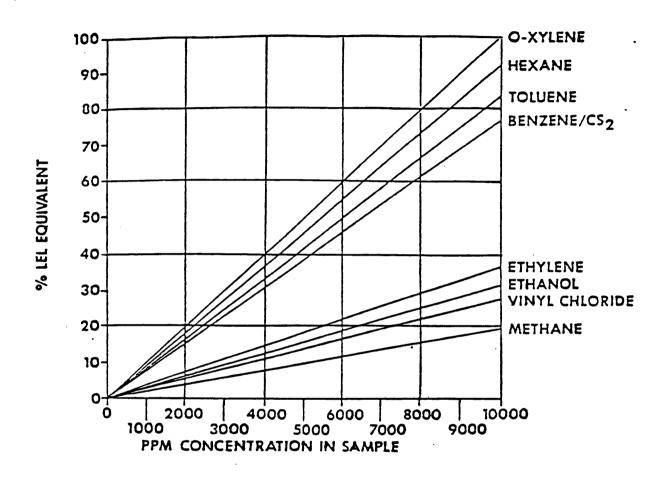


Figure 6-1. Conversion Curves Showing Relationship of PPM Concentrations of Various Gases to Percent L.E.L. Equivalents.

TABLE 6-1. DETECTOR TUBES FOR AMBIENT AIR MONITORING

	Detector Tube ¹	Positive Reaction Indicates Presence of	Detection Limit	TLV (ACGIH 1982)	MUC ²
H	Polytest	2, 3, 4, 5, 6*	50 ppm (benzene) 2000 ppm (acetone)		
2.	Ethyl acetate 200/a	Esters, 3, 4, 5	200 ppm	400 ppm	1000 ppm
3.	Benzene 0.05	Aromatic H/C	15 ppm	10 ppm	200 ppm
4.	Acetone 100/b	Ketones	100 ppm	750 ppm	1000 ppm
5.	Alcohol 100/a	Alcohols	100 ppm		
9	Hydrocarbon 0.1%/b	Aliphatic H/C	0.1% (butane)		
7.	Sulfur dioxide 1/a	Sulfur dioxide	1 ppm	2 ppm	100 ppm
8	Hydrogen sulfide 1/c	Hydrogen sulfide	l ppm	10 ppm	500 ppm

¹ List is a modification of the sampling strategy for unknown substances developed by National Draeger, Inc. Tubes are manufactured by National Draeger, Inc.

 $^{^2}$ MUC = Maximum Use Concentration based on full-faced respirators. If levels exceed this value, respiratory protection must be increased.

^{*} A positive test also occurs for arsin, carbon disulfide, nitric oxide, carbon monozide, and methyl bromide.

TABLE 6-2. RESPIRATOR PROTECTION FACTORS

Type Respirator	Facepiece Pressure	Protection Factor
Half- or Quarter-mask, High-Efficiency Air Purifying	negative	10*
Full Facepiece, High Efficiency Air Purifying	negative	50*

^{*} These Protection Factors pertain to properly fitted facepieces with new cartridges and filters.

Factor associated with the particular respirator in use. If the concentrations of contaminants are not conservatively within the listed Protection Factor, work activities will be terminated until satisfactory respiratory protection can be obtained.

6.2 Personal/Site Hygiene

Punctured, internally contaminated, cracked, stubbornly soiled, protective items will be disposed in sealed plastic bags.

Paper, rags, and other disposables used on-site or in equip-ment/sample container clean up will be disposed of in sealed plastic bags.

No food will be consumed on the exploration site. Employees will thoroughly wash their hands, forearms and face before consuming food or beverages other than water held in disposal cups. Drinking water will be available at the perimeter of the site being investigated. Disposable cups will be used to consume water after protective gauntlet gloves are removed.

Soil cuttings from augering which display contamination will be removed from the site in suitable sealed containers for eventual disposal.

6.3 Emergency Medical Services

In the event of an employee injury or other medical emergency on-site, the Supervising Geologist and other personnel trained in first aid and CPR will immediately provide assistance. An MSA model self-contained breathing apparatus (SCBA) will be nearby for use by the Supervising Geologist and back-up geologist during emergency rescue situations requiring respiratory protection.

A portable eye/face wash unit will be in the immediate proximity of any field work in progress. Flushing of the eyes should be started immediately (within 15 seconds) and should continue for 15 minutes whenever hazardous gas, liquid, dust or particles that may be chemically contaminated, enter the eye.

Because contact lenses tend to hold contaminants in close proximity to the eye ball and inhibit flushing, contact lenses will not be allowed on-site.

Additional first aid supplies will be kept in close proximity to field work activities for quick, easy access.

Medical emergencies that require outside medical assistance will be treated by the medical clinic at Tinker AFB. The clinic is in close proximity to the work site and is staffed with trained medical professionals. Pertinent communications information regarding medical services will be made available to all personnel during the safety training session.